LSAMP Inspire Program

2016-17

ANNUAL CONFERENCE

Cultivating STEM Identity for Student Success

FEBRUARY 3-4, 2017

Scheman Building at Iowa State Center

Ames, Iowa

Augustana College

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Rock Island, Illinois
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Office of the President

Welcome to the 2016-2017 LSAMP IINSPIRE Conference:
Cultivating STEM Identity for Student Success

Dear Conference Participant:

Who are you? Who are you called to be?

These are questions we ask at Augustana College as part of a process we refer to as Vocational Reflection. One way to think of it this: how might you feel led to use your innate gifts, skills and passions on behalf of a world that is in great need of them?

An important part of discerning the answers to these questions comes in the form of the encouragement we receive from those around us. It is very likely that part of the reason you are here is that people have told you have a knack for science, technology, engineering, mathematics, or – more likely – some combination thereof.

This year, we member institutions of the Louis Stokes Alliance for Minority Participation gather around the theme of "Cultivating STEM Identity." This identity is in part earned through competence and hard work, yes; but it is also in part conferred by the recognition and reinforcement of the scholarly community.

With thanks to all those whose sponsorship and effort made this conference possible, I would like to encourage you as a participant to think deeply about the ways in which each one of us has responsibility for building a STEM Identity for the 21st century that is inclusive and inviting. Whether you are a student, a department chair, or even a college president, each of us has a role in this endeavor. By your presence here, I know you take this role seriously. Thank you.

Very truly yours,

Steven C Bahls

Steven C. Bahls
President
Augustana College

LSAMP Inspire Program

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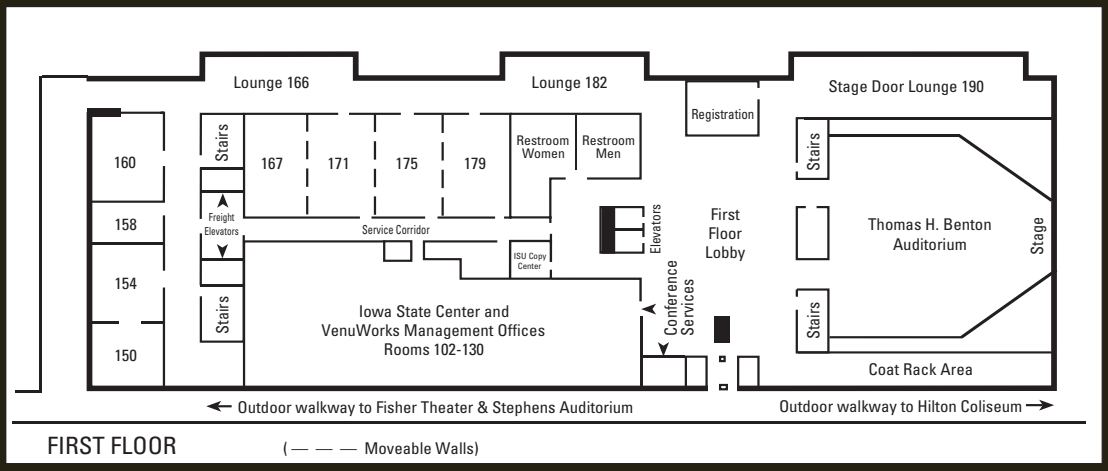

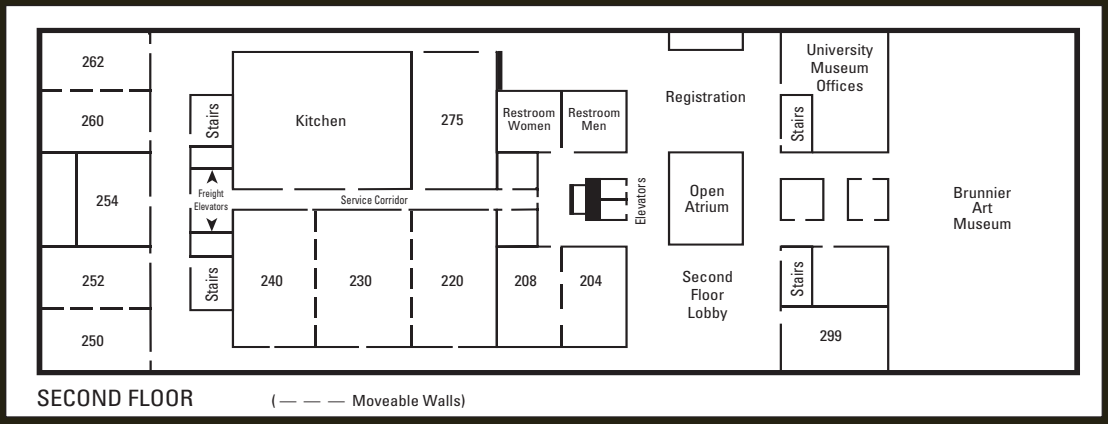

Keynote Speakers

Gabriel A. Montaño

Technical Staff Member, Center for Integrated Nanotechnologies, Los Alamos National Laboratory

Dr. Gabriel Montaño is a native New Mexican born and raised in Gallup, NM. Dr. Montaño attended New Mexico State University where he received his Bachelors of Science in Biology in 1997. He then attended Arizona State University where he completed his PhD in the lab of Dr. Robert Blankenship in 2002 in the Department of Chemistry and Biochemistry. Upon completion of his PhD., Dr. Montaño accepted a postdoctoral appointment in biomatierals design with Dr. Andy Shreve at Los Alamos National Laboratory where Dr. Montaño was an Intelligence Community Postdoctoral Fellow. In 2005, Dr. Montaño accepted a position as a Technical Staff Member with the newly developed Center for Integrated Nanotechnologies where he currently resides. Dr. Montaño's lab group investigates membrane biophysics. In particular, they are interested in bio- and bio-synthetic interfaces and supramolecular structure/function relationships. Many biological processes rely on complex interfacial interactions to drive function ranging from infectious diseases to organ function and complex processes such as photosynthesis. Understanding and mimicking such interactions are the focus of the Montaño team. In addition, Gabriel is also devoted to outreach initiatives, in particular enhancing diversity in STEM fields. Among his outreach efforts, Gabriel has served as the President of the Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) (2015-16) as well as served as a SACNAS Board of Directors Member (2011-2014), a member of the Minority Affairs Committee of the Biophysical Society and as a member of the Hispanic Association of Colleges and Universities (HACU) STEM task force.

Catherine Good

Associate Professor, Baruch College (CUNY)

Dr. Good received a master's degree in mathematics from the University of Kansas in 1994 and an Ad Hoc Interdisciplinary Ph.D. in mathematics education and social psychology from The University of Texas at Austin in 2001. While a postdoctoral research fellow at Columbia University from 2001-2005 she developed a research program that focuses on the social forces that shape academic achievement, learning, motivation, and self-image, particularly for females in STEM disciplines. In particular, she studies the effects of stereotype threat and develops interventions to help students overcome its effects. Specifically, she focuses on increasing students' sense of belonging to STEM disciplines and fostering incremental views of intelligence as methods of combating the cultural stereotypes.

Invited Speakers

Brian Thomas

Founder, KIPNspire Group

Brian Thomas is originally from Dallas, Texas where he graduated from Dallas Lincoln High School before traveling for college to the University of Arkansas at Pine Bluff. Graduating Summa Cum Laude as a collegiate athlete and quickly moving up in his professional career. Brian is currently a Plant Manager in the Automotive Industry where he is responsible for leading a team of 160 people as part of a $90 Million dollar operation. In 2014 Brian founded his company KIPNspire Group where he educates and motivates the masses through educational and motivational teachings of professional development and life skills. Brian dreams of reaching the masses through his keynote addresses, workshops, seminars, live and virtual conferences, and online presence.

Brian is the co-creator of the Greatness Awaits Conference and also the creator and host of the Thursday Night Professional Development Conference Call. 7pm Eastern every Thursday night. Brian is extremely motivated to help as many people prepare themselves to face the challenges that are seen and unseen in their personal pursuit of greatness.

Sunday Faronbi

Coach, Speaker, Trainer, Rehoboth Consulting Inc.

After a career that spans more than 25 years as an engineer and project manager, Sunny Faronbi is using the skills he has developed by leading project teams to help others improve their leadership and communication skills.

As a leadership coach, speaker and trainer, Sunny helps organizations with technical teams by coaching their people to develop the necessary people skills that prepare them for leadership positions. He is a member of the *John Maxwell Team* of coaches and speakers, and is also a certified Emotional Intelligence coach. Sunny is known as an engaging speaker and has received excellent reviews from his audiences.

CONFERENCE SCHEDULE

Friday, February 3

12:00 - 1:00 PM	*Optional Lunch*	First Floor Lobby
12:00 - 1:00 PM	**PRE-CONFERENCE DISCUSSIONS** **Faculty/Staff Session A:** BIRDS OF A FEATHER: *LSAMPing at Small Universities* **Faculty/Staff Session B:** BIRDS OF A FEATHER: *LSAMPing at Public Universities* **Faculty/Staff Session C:** BIRDS OF A FEATHER: *LSAMPing at 2-year Colleges*	 Conference Room 171 Conference Room 175 Conference Room 179
1:00 - 1:50 PM	**WELCOME & OPENING KEYNOTE** *Steven C. Bahls, Augustana College* **I WASN'T BORN WITH A CHIP, I EARNED IT!** *Gabriel A. Montano, Los Alamos National Laboratory*	 Thomas H. Benton Auditorium
2:00 - 2:50 PM	**SESSIONS** **Faculty/Staff Session A:** Key Actions for Successful Mentors of Graduate Students and Undergraduate Researchers - What do the Data Tell Us? **Faculty/Staff Session B:** Counter-Storytelling: *Students of Color STEM Identities* **Student Session A:** "I AM A SCIENTIST": *Building Science Identity at the National SACNAS Conference* **Student Session B:** Is an REU for You?	 Room 150-154 Room 167-171 Room 175-179 Room 275
3:00 - 3:50 PM	**SESSIONS** **Faculty/Staff Session A:** Building Capacity on Your Campus *(Session ends at 5:00pm)* **Student Session A:** Stem Skills in the US Industry/Workforce - What Every Employer Wants from Graduates	 Room 150-154 Room 167-171
3:00 - 5:00 PM	**STUDENT OPPORTUNITIES FAIR**	First Floor Lobby
5:00 - 6:30 PM	**STUDENT POSTER SESSION & RECEPTION**	Stage Door Lounge
6:00 - 7:00 PM	**BREAK**	
7:00 - 8:30 PM	**STUDENT NETWORKING PROGRAM & DINNER** **BEYOND THE GPA** *Brian Thomas, KIPNspire Group*	 Conference Rooms 167-179
8:30 - 10:30 PM	**HIDDEN FIGURES PRIVATE MOVIE SCREENING**	Ames Cinemark 12

Saturday, February 4

7:30 - 8:30 AM	*Breakfast*	First Floor Lobby
8:00 - 8:50 AM	**MORNING KEYNOTE** **MINDSETS MATTER IN MATH** *Catherine Good, Baruch College (CUNY)*	 Thomas H. Benton Auditorium
9:00 - 9:50 AM	**SESSIONS** **Faculty/Staff Session A:** Counteracting Stereotype Threat in the Classrom - Reseach-Based Tools and Strategies **Faculty/Staff Session B:** The Freshman Research Initiative: *Promoting STEM Identity Through Introductory Course-based Research* **Student Session:** The Read IT Theory to Success **Faculty/Staff and Students Session:** Hidden Figures Movie Review & Discussion	 Room 150-154 Room 167-171 Room 175-179 Room 275
10:00 - 10:50 AM	**SESSIONS** **Faculty/Staff Session A:** IINSPIRE LSAMP History, Data, and Proposed Reseach **Faculty/Staff Session B:** Using Strengthsquest to Help Students Develop a STEM Identity **Student Session A:** Leveraging an Undergraduate Job into Social, Personal, and Academic Success **Student Session B:** Applying for Scholarships	 Room 150-154 Room 167-171 Room 175-179 Room 275
11:00 - 11:50 AM	**SESSIONS** **Faculty/Staff Session A:** Intersecting Identities and STEM Identity Development **Faculty/Staff Session B:** Technology for an Engaged Classrom to Enhance Critical Thinking **Student Session A:** Preparing and Applying to Graduate School **Student Session B:** Making the Most of Your Research Experience	 Room 150-154 Room 167-171 Room 175-179 Room 275
11:50 - 12:10 PM	**BUFFET LUNCH**	
12:10 - 1:00 PM	**INVITED SPEAKER & LUNCH** **YOUR EMOTIONS CAN WORK FOR YOU** *Sunday Faronbi, Rehoboth Consulting, Inc.*	 Rooms 167-179
1:10 - 2:00 PM	**AWARDS CEREMONY**	Thomas H. Benton Auditorium
2:10 - 3:00 PM	**STUDENT STEM IDENTITY PANEL**	Thomas H. Benton Auditorium

Presenter Biographies

Doug Elrick is a second-year doctoral student at Iowa State University in the School of Education. His concentration is in Instructional Technology and he is focusing on online education. Doug is a practicing forensic scientist, having worked in the field for twenty-years. He has specialized in computer forensics and has worked in a government crime laboratory and private civil lab. Doug has been teaching computer forensics in professional training events for more than twenty years and has provided such training in the US, Italy, Germany, Croatia, Japan, Australia, and Malaysia. Doug has also been teaching at the college level for ten years in undergraduate and graduate courses.

Paul Faronbi recently obtained his B.S. in Chemical Engineering with a minor in Biomedical Engineering from Iowa State University in December 2016. He has been a part of IINSPIRE-LSAMP for about 3 years, conducting academic research with IINSPIRE for one summer and two semesters in Biomedical research for regenerating severed nerve cells. In addition, Paul completed internships at Cargill as a Production Management Engineer Co-op for 8 months in a soybean processing facility and as Operations Management Trainee Intern for Nestle in a frozen foods facility for 3 months. Furthermore, he has been a part of the National Society of Black Engineers (NSBE) and Society of Hispanic Professional Engineers (SHPE) since 2012, his freshman year of college. He is one of the founding members of iResearch; an organization dedicated to empowering students to gain experience and professional development geared towards education and jobs in research-related fields in industry and academia. Paul accepted an offer from ConAgra Brands as a Manufacturing Trainee Engineer in Missouri starting this month. He has a passion for leadership, and considers it a great honor to be a member of this panel.

Gwendolynn Denise Fine received the Bridge Scholarship from the University of Northern Iowa and graduated with a Bachelors degree in Biology on May 10, 2014. She is an active member of Sigma Gamma Rho Sorority, Inc. and an active member in the Indianapolis, IN community. In her free time, she likes to play with her dog, hang out with friends and spend quality time with her boyfriend. Gwendolyn also enjoy travelling, reading, and watching movies. She will be graduating from the University of Saint Francis with her Masters of Healthcare Administration on May 6, 2017. She is currently working for Indiana University Health as a Medical Technologist II and aspires to be a Hospital Administrator.

Cailin Huyck Orr is the Assistant Director of the Science Education Resource Center (SERC) at Carleton College where she does project management and programming for faculty professional development and dissemination of best practices for science teaching, community visioning and bringing science into broader use. She is also on the leadership team of the NSF Science Talent Expansion Program InTeGrate helping faculty members make program-level changes to support all students and increase STEM students preparation for the workforce.

Tyanez Jones is a second-year doctoral student in the School of Education at Iowa State University with an emphasis in Curriculum and Instructional Technology and Social Justice. She works as a graduate research assistant and teaches the first-year student seminar with the Science Bound program. Science Bound is a pre-college/college program that empowers students of color in Iowa to pursue degrees and careers in STEM (science, technology, engineering, and math).

Queenster Nartey earned her B.A. in Biological Chemistry from Grinnell College in May 2016, and is currently serving as an ORISE Fellow in the Division of Food Contact Notifications at the U.S. Food and Drug Administration in College Park, Maryland through the Oak Ridge Institute for Science and Education Program. While a student at Grinnell, Queenster conducted research every summer and has been an LSAMP student member for over 3 years. After studying abroad in Copenhagen for semester, Queenster worked closely with biology professor Shannon Hinsa-Leasure on research investigating the antimicrobial properties of copper in hospitals which they published a journal article in the American Journal of Infection Control. She presented this work at the Annual Biomedical Research Conference for Minority Students in Seattle, WA. in 2015, where she was recognized with an Outstanding Poster Presentation in Microbiology award, and at the LSAMP IINSPIRE Annual Conference, where she finished second in the student poster competition. Queenster plans to pursue her medical and graduate degree following the completion of her FDA fellowship.

Savitha Pinnepalli joined IVCCD (Marshalltown Community College) in 2015 as Associate Professor in Computer Software & Technology. Her prior experience includes Chair/ Assistant Professor in Rhodes State College. She served as ERA Manager at the Office of Sponsored Programs and also taught for eight years in the Computer Science Department at Louisiana State University. She has a Master's Degree in Power Electronics Engineering (India) and Master's Degree in Engineering Science from LSU. She is a certified CIW Internet Business Associate. She is the recipient of "Tiger Athletic Foundation undergraduate teaching award – March 2001" from LSU and RPCC Outstanding Teaching Faculty March 2012. She is a Salzburg and Bioscience Industry Fellowship Fellow. She has been a reviewer for NSF ATE Grants. She is also the

recipient of several Board of Regents grants in Louisiana and levy grant at Iowa. Her expertise is in Computer programming, Web Design and training in Office Applications. She has presented in several National Conferences including the Innovations. She has a passion for motivating students to pursue Technology and Engineering fields.

Sarah Rodriguez, is an assistant professor of Higher Education at Iowa State University. Dr. Rodriguez's research addresses issues of equity, access, and retention for Latina/o students in the higher education pipeline, with a focus on STEM identity development. She is involved with several large-scale interdisciplinary research projects focused on institutional environments and STEM identity development which have been sponsored by the National Science Foundation (NSF). She has served as a New Mathways Project Mentorship Program Coach for the Charles A. Dana Center, supporting college implementation of multiple mathematics pathways, acceleration to complete college level math courses quickly, and intentional use of strategies. During her career, Dr. Rodriguez has been named a NASPA Emerging Faculty Leader, an American Educational Research Association (AERA) Emerging Scholar, and a Gates Millennium Scholar. She received her PhD in Higher Education Leadership from The University of Texas at Austin and holds an MS from The University of Tennessee as well as a BA in English and Spanish from Texas A&M University-Commerce.

Derrick Keith Rollins, Sr. grew up in inner city Kansas City, Missouri. He received a B.S. degree in chemical engineering from the University of Kansas in 1979. In the fall of 1985 he returned to college and earned the following degrees from The Ohio State University: an M.S. degree in chemical engineering in 1987, an M.S. degree in statistics in 1989, and a Ph.D. in chemical engineering in 1990. Professor Rollins joined the Iowa State University (ISU) faculty in the fall of 1990 in a unique joint appointment between the Statistics Department and the Chemical Engineering Department. Since coming to Iowa State, Dr. Rollins has received many research grants and awards including the 2012 McDonald Mentoring Award from the Tau Beta Pi National Engineering Honor Society, 2005 Regents Faculty Excellence Award given by the Iowa Board of Regents, the 2000 ISU Presidential Service Award, and in 1994 the National Science Foundation Presidential Faculty Fellows Award, which was considered the highest honor the federal government gives young scientists and engineers. His research areas include glucose monitoring, modeling and control for diabetic people and for improving cancer protocols in Biomedical Engineering; Bio- and Material- Informatics and datamining; and development of processes for non-destructive testing procedures. He is the ISU Director for IINSPIRE LSAMP.

Jim Swartz is a Professor of Chemistry at Grinnell College. He attended De Anza College and Stanislaus State College in California. He received a PhD in chemistry at the University of California at Santa Cruz. After postdoctoral research at CalTech he joined the faculty at Grinnell College in 1980. Jim coordinated the NSF-funded Project Kaleidoscope Pedagogies of Engagement faculty development project. In July, 2012 he was appointed as Interim Associate Vice President of Analytical Support/Institutional Research (a new office) at Grinnell. He currently is a team chair for the Higher Learning Commission of the North Central Association. He serves on the Advisory Council of the Iowa Energy Center, which he chaired from 2008-11. Dr. Swartz has served as a consultant to approximately 50 colleges and universities in curriculum development and the planning of science facilities.

Lizeth Tamayo is currently a Susan G. Komen Fellow at the University of Illinois at Chicago obtaining a Masters of Public Health in Epidemiology. As a Komen fellow, her research aims are to better understand and eliminate health disparities in breast cancer. Prior to her time at UIC, she was a recipient of the Gates Millennium Scholarship which allowed her to attend Augustana College. At Augustana Tamayo was a triple major in Biochemistry, Pre-medicine, and French. During her time at Augustana she was able to obtain the IINSPIRE LSAMP grant to help further her research, under Dr. Pamela Trotter, on mitochondrial transporters in yeast. In the future Tamayo plans to continue research in cancer and health disparities as well as obtain a PH.D in Epidemiology.

U. Sunday Tim is Associate Professor of Agricultural and Biosystems Engineering and IINSPIRE LSAMP faculty Leader at Iowa State University. Dr. Tim earned his Bachelor of Engineering degree in Structural Engineering and PhD degree in Civil and Environmental Engineering from Concordia University, Canada. He has been Program Director and co-PI of several NSF REU Site programs and the USDA-NIFA Minority Scholars Program. His research interests include environmental modeling, environmental forensics, geographic information systems, virtual reality, data analytics, and distributed computing.

Nancy Woods has taught Classical Physics and Calculus at the Boone Campus of the Des Moines Area Community College for over 30 years. Dr. Woods is actively involved with the IINSPIRE-LSAMP program; she serves as a faculty REU Coordinator for DMACC at the Boone and Ames Hunziker Center. Dr. Woods is also actively involved with the DMACC Honors Program as well as Phi Theta Kappa, the International Honor Society for 2-Year Colleges.

12:00 - 1:00 PM

BIRDS OF A FEATHER SESSION: LSAMPING AT SMALL UNIVERSITIES – ROOM 171

Faculty, Staff, and Professional Session

SESSION MODERATOR

Katherine McCarville, Upper Iowa University

All LSAMP programs face challenges, but some of these are even more difficult at smaller universities that may not have a well developed "grants culture." Budgeting and fiscal management of grant funds; mechanisms for building support among faculty, students and staff; persuading additional faculty to learn more about diversity and inclusive pedagogies; and other topics will be explored. Solutions and suggestions will be shared among the participants, with the goal of creating a support network.

BIRDS OF A FEATHER SESSION: LSAMPING AT PUBLIC UNIVERSITIES – ROOM 175

Faculty, Staff, and Professional Session

SESSION MODERATOR

Douglas Mupasiri, University of Northern Iowa

Join a roundtable discussion about opportunities, best practices, and challenges of building and managing a LSAMP program on a large university campus. Budgeting and fiscal management of grant funds; mechanisms for building support among faculty, students and staff; persuading additional faculty to learn more about diversity and inclusive pedagogies; and other topics will be explored. Solutions and suggestions will be shared among the participants, with the goal of creating a support network.

BIRDS OF A FEATHER SESSION: LSAMPING AT 2-YEAR COLLEGES – ROOM 179

Faculty, Staff, and Professional Session

SESSION MODERATOR

Cynthia Bottrell, Hawkeye Community College
Brian Ritter, Nahant Marsh

Join a roundtable discussion about opportunities, best practices, and challenges of building and managing a LSAMP program on a 2-year college campus. Budgeting and fiscal management of grant funds; mechanisms for building support among faculty, students and staff; persuading additional faculty to learn more about diversity and inclusive pedagogies; and other topics will be explored. Solutions and suggestions will be shared among the participants, with the goal of creating a support network.

1:00 - 1:50 PM

Welcome & Opening Keynote Presentation

Thomas H. Benton Auditorium

Gabriel A. Montaño

I wasn't born with a chip, I earned it!

I grew up in Gallup, NM, a small town at the edge of the Navajo border in Northwest New Mexico. In Gallup, race was broken down along the line of: Indian/non-Indian. Being a Chicano of Mexican and Spanish decent, I grew up as a non-Indian member of the majority. I largely grew up protected from racism, racial profiling, prejudice and all that it came with, or so I thought… I was comfortable in my heritage even if I didn't fully appreciate it.

As I grew up I did what a lot of minority students do as they enter the unknown territory of advanced education and all that it encompasses. I pushed my heritage to the side, I tried as hard as possible to assimilate into the new world of academia I found myself in, one that predicated equality upon the premise of existing as "colorblind". In short, I lost myself and anything recognizable to my family. As I continued my journey, I started finding that no matter how much I tried to limit my outward presentation to the world, the world would always see a Chicano and that Chicano represented different things to different people: success, diversity but also fear and undeserved recognition. I also found that in my lack of embracing who I truly was I was severely limiting my own potential. My strength as a scientist did not come from trying to assimilate to what "I thought" the scientific community wanted me to be, my strength came from my unique attributes and the cultural identity I brought as a Chicano from Indian Country.

In this talk, I will share with you my journey to myself and the perceived "Chip on my shoulder" that my life and experiences have provided me. The goal is to help each of you be the best you that you can be, and it starts closer to home than you may even realize.

2:00 - 2:50 PM

KEY ACTIONS FOR SUCCESSFUL MENTORS OF GRADUATE STUDENTS AND UNDERGRADUATE RESEARCHERS – WHAT DO THE DATA TELL US? – ROOMS 150-154

Faculty, Staff, and Professional Session

SPEAKERS

D. Raj Raman, Iowa State University
Brandi N. Geisinger, Iowa State University
Mari R. Kemis, Iowa State University
Arlene de la Mora, Iowa State University

Because good mentoring helps cultivate a strong STEM identify, mentoring is central to graduate education, and to the success of undergraduate research assistants. In this talk, we will discuss what we have learned regarding mentoring behaviors that enhance the success of graduate and undergraduate student researchers. We developed an instrument to identify key mentoring behaviors of participants in research experience for undergraduate programs (REUs), and then built upon our results there to develop a stronger instrument that we distributed to graduate students at ISU. We used exploratory factor analysis (principal axis factoring) with promax rotation, and conducted confirmatory factor analysis to confirm the factor structure. We will discuss the components of effective mentoring in detail, as well as the implications for training new mentors and improving the mentoring of graduate and undergraduate students. [P] In the latter part of the talk, where we discuss the key components of effective mentoring, we will engage the audience in reflecting on specific examples of how each behavior might be manifested in their own work.

COUNTER-STORYTELLING: STUDENTS OF COLOR STEM IDENTITIES – ROOMS 167-171

Faculty, Staff, and Professional Session

SPEAKERS

Tyanez Jones, Iowa State University
Doug Elrick, Iowa State University

This session focuses on the initial STEM identity development of students of color (SOC) attending a predominantly white institution (PWI). The theoretical framework for this work was Critical Race Theory counter stories which gave voice to the students' lived experiences regarding the factors that influenced their STEM identity. As part of a course project, the researchers identified first-year college students, who had participated in a pre-college STEM program, that were majoring in a STEM field. The students were asked to complete a brief survey about who and what influenced them to major in a STEM discipline. Based on their survey responses, in depth interviews were conducted with a subset of the survey respondents. The results from the students' narratives indicate that there were key experiences, events, and individuals that influenced them to major in a STEM field. Student involvement in the pre-college, extracurricular STEM program had a direct and indirect impact on their STEM identify and provided valuable social capital. Positive external influences on creating STEM identities included teachers and families. Their teachers, who then provided greater influencing encouragement, recognized this capital. Family members also were influential by providing examples and involvement in the extracurricular program.

2:00 - 2:50 PM (cont.)

"I AM A SCIENTIST": BUILDING SCIENCE IDENTITY AT THE NATIONAL SACNAS CONFERENCE – ROOMS 175-179

Student Session

SPEAKERS

Corey Welch, Iowa State University
Gabriel Montano, Los Alamos National Laboratory

PANELISTS

Kia Barry, Iowa State University
Andrea Fondren, Iowa State University
Christopher Hernandez, Iowa State University

SACNAS (Society for the Advancement of Chicano/Hispanic & Native American Scientists) is the largest multicultural and multidisciplinary scientific organization in the country and its annual national conference serves to bring over 4000 underrepresented scientists together to share their research, participate in professional development workshops, networking, and recruitment for undergraduate and post baccalaureate opportunities across STEM.

An important focus each year for SACNAS is developing and strengthening what it means when we say "I am a scientist." In this workshop, we have brought together 7 people who have been profoundly impacted by the National SACNAS conference and how the 'SACNISTA experience' has furthered our individual scientific identities and career plans. We will talk about the conference, SACNAS chapters, undergraduate funding opportunities, and take questions from the audience about how they can become involved in this amazing community of scientific leaders.

A summary handout of 2017 funding/abstract deadlines, how to establish a SACNAS chapter at your college/university, and other leadership opportunities will be provided.

IS AN REU FOR YOU? – ROOM 275

Student Session

SPEAKERS

Derrick Rollins, Iowa State University
U. Sunday Tim, Iowa State University
Steve Karsjen, Ames Laboratory
Svitlana Zbarksa, Iowa State Univeristy

Do you ever wonder what it means to do undergraduate research in a STEM discipline? Most students have to wait until graduate school to find the answer to this question. This session will provide an opportunity for you to learn about REU and related undergraduate research program on the ISU campus, what you need to know to apply to those programs, and how to find resources to help make research part of your undergraduate education. The session also offers a great introduction to students who are just beginning to think about the possibilities of undergraduate research.

3:00 - 3:50 PM

STEM SKILLS IN THE U.S. INDUSTRY/WORKFORCE: WHAT EVERY EMPLOYER WANTS FROM GRADUATES – ROOMS 167-171

Student Session

SESSION MODERATOR

U. Sunday Tim, Iowa State University

A consistent theme running through numerous employer survey and feedback on graduate skills point to the desire for graduates to possess a set of knowledge, platform skills and core competencies which will allow them to contribute fully in the workplace. Survey data also indicates that while employers are generally satisfied with the employability skills of graduates compared to non-graduates, gaps in skills and competencies exist, prompting the following questions: Which "soft" or "hard" skills are most valued by employers when making hiring decisions? How are employers assessing these skills during the hiring process? Do students who go above and beyond to acquire those skills make themselves significantly more attractive to employers? Can other credentials help increase graduate job placement rates? How can educators work more collaboratively with industry and employers who hire their graduates? In this session, expert panelists and leaders from a range of STEM employment sector will address these key questions. They will present their perspectives on the field and the type of workforce skills and competencies, and what it takes to become a competitive applicant and to have successful career in STEM industry.

3:00 - 5:00 PM

BUILDING CAPACITY ON YOUR CAMPUS – ROOMS 150-154

Faculty, Staff, and Professional Session

SPEAKERS

Jim Swartz, Grinnell College
Cailin Huyck Orr, SERC at Carleton College

This session is focused on building capacity of the program to make change on your campus, following on the success of the first generation of LSAMP support and looking ahead to the next phase of the project. The topic was proposed in response to the requests from the 2016 faculty workshop evaluation, where participants expressed interest in building the strength of their teams and sense of community among the faculty participating in the project.

Multifaceted approaches will be explored for supporting institutional change on your campus. Topics will include making a case for your program on campus, aligning with institutional goals, finding and maintaining collaborative relationships and engaging new people in project activities. Specific examples of how practices have been put into place at other institutions will be presented. Together we will explore these materials and consider how you can put this information into practice. We will also discuss the next stages of the IINSPIRE professional development program, topics you would like to see in future workshops, and materials that could be developed by Alliance members to support your participation.

Attendees will have the opportunity to work together in groups to develop plans, consider how they can collaborate, and suggest ways that the alliance can support them in their efforts. Attendees are encouraged to bring a laptop or tablet computer.

The program will be based on material from the Network of STEM Education Centers, HHMI Capstone institutions, the InTeGrate STEP Center and the NAGT Building Strong Departments program.

7:00 - 8:30 PM

Invited Speaker

ROOMS 167-179

Brian Thomas

Beyond the GPA

Today's world of careers stretches beyond the cubicle. There are critical skills, techniques, and social navigation that is required to secure employment. "Beyond the GPA" will highlight Industry requirements that are Written and Un-Written and provide the patch to success for future pioneers.

Key area of focus:

- Personal Brand Management
- Networking Towards Success
- Interviewing to Greatness
- Cultural Sensitivity and Awareness

8:30-10:30 PM

HIDDEN FIGURES MOVIE: FREE PRIVATE SCREENING – AMES CINEMARK 12

Join us for a free private screening of the award nominated movie Hidden Figures. The movie begins at 9:00pm. A shuttle bus will be available to transport movie-goers to the theater staring at 8:30pm.

As the United States raced against Russia to put a man in space, NASA found untapped talent in a group of African-American female mathematicians that served as the brains behind one of the greatest operations in U.S. history. Based on the unbelievably true life stories of three of these women, known as "human computers", we follow these women as they quickly rose the ranks of NASA alongside many of history's greatest minds specifically tasked with calculating the momentous launch of astronaut John Glenn into orbit, and guaranteeing his safe return.

8:00-8:50 AM

Keynote Presentation

Thomas H. Benton Auditorium

Catherine Good

Mindsets Matter in Math

Students and their instructors are often unaware of how stereotypes about mathematics ability can affect participation, performance, and learning in mathematics. These effects are triggered—sometimes very subtly—by situations that evoke ability-impugning stereotypes about gender, race, or cultural groups. In this session, Dr. Good will discuss the ways in which stereotypes can disrupt learning and performance as well as healthy mindsets that can protect against the negative message of fixed ability.

9:00-9:50 AM

COUNTERACTING STEREOTYPE THREAT IN THE CLASSROOM-- RESEARCH-BASED TOOLS AND STRATEGIES – ROOMS 150-154

Faculty, Staff, and Professional Session

SPEAKER

Catherine Good, Baruch College (CUNY)

I'm just not a math person! How many times have you heard this statement as an excuse for students' low performance in math? But it conveys more than just an excuse...it also belies an underlying mindset about the nature of one's math abilities. And as research has shown, how students think about themselves as learners...their mindsets...have important implications for their motivation, learning, engagement, and performance. In this session, you will learn about a variety of mindsets that shape students' identities as learners. Tese include their beliefs about the nature of math intelligence—whether they feel like valued members of the mathematics community of learners. You will also learn how your own mindsets can impact your teaching practices. Finally, you will learn specific teaching strategies that create room for many more students to feel like valued members of your classroom.

THE FRESHMAN RESEARCH INITIATIVE: PROMOTING SCIENCE IDENTITY THROUGH INTRODUCTORY COURSE-BASED RESEARCH – ROOMS 167-171

Faculty, Staff, and Professional Session

SPEAKERS

Elizabeth Sandquist, Iowa State University
Cinzia Cervato, Iowa State University
Craig Ogilvie, Iowa State University

The Freshmen Research Initiative (FRI) is a Howard Hughes Medical Institute-funded program at Iowa State University whose strategy is to create course-based undergraduate research experiences for first-year students in the STEM disciplines. One advantage of course-based research is its accessibility to students who may otherwise not participate in research. Barriers such as financial and personal responsibilities, awareness of cultural norms associated with scientific research, and the selection of the "best" students are reduced when students can perform research in class for credit. These authentic, discovery-based courses are adapted from faculty research on campus in the fields of biology, geology, and computer and electrical engineering, among others. In Spring 2017, 12 research streams will be available, reaching approximately 200 freshmen. Students participating in the FRI report enhanced science identity, indicating that they felt like scientists, responsible for their projects, and a part of a scientific community. They also related gains in competency, such as confidence to do well in future science courses, discussing scientific concepts with others, and contributing to science. At this session, audience members will consider aspects of their research which could be adapted to course-based research at the freshmen level, and hear about FRI courses in their disciplines.

9:00-9:50 AM (cont.)

THE "READ IT" THEORY TO SUCCESS – ROOMS 175-179

Student Session

SPEAKER

Brain Thomas, KIPNsire group

A career in Corporate America, Private Industry, or Government comes with the development, use, and mastery of a unique set of skills. We are a skills-based world and those who master their skill set achieve greatness beyond measure. The "Read It Theory to Success" will provide insight into how skills are classified, utilized, and maximized.

Key areas of focus:

- Skills to Maximize Resume Development and Usage
- Goal Setting and Action Plan Development
- Developing a Can Do Attitude
- Opportunity Readiness Skills

HIDDEN FIGURES MOVIE DISCUSSION – ROOM 275

All Attendees

SESSION MODERATOR

Paul Faronbi, Iowa State University

Conference attendess who watched the move Hidden Figures are invited to a roundtable review and discussion of the film.

As the United States raced against Russia to put a man in space, NASA found untapped talent in a group of African-American female mathematicians that served as the brains behind one of the greatest operations in U.S. history. Based on the unbelievably true life stories of three of these women, known as "human computers", we follow these women as they quickly rose the ranks of NASA alongside many of history's greatest minds specifically tasked with calculating the momentous launch of astronaut John Glenn into orbit, and guaranteeing his safe return.

10:00-10:50 AM

IINSPIRE LSAMP HISTORY, DATA, AND PROPOSED RESEARCH – ROOMS 150-154

Faculty, Staff, and Professional Session

SPEAKERS

Dr. Saba Ali, Professor, School of Education, University of Iowa
Dr. Lorenzo Baber, Associate Professor, School of Education, Iowa State University
Dr. Sarah Rodridguez, Assistant Professor, Iowa State University
Dr. Mary Darrow, IINSPIRE LSAMP Assistant Director, Iowa State University

In this session, the IINSPIRE LSAMP Research Team will present a brief history of LSAMP and an overview of data that has been collected in the first 5 years related to the IINSPIRE LSAMP student experience and institutional outcomes. In order to further our understanding of STEM success for the underrepresented minority students in this program, associated research studies will be conducted with project activities to examine their effects and contribute to the knowledge base. The IINSPIRE LSAMP Research Team will discuss their research backgrounds as it relates to the proposed research in the IINSPIRE LSAMP Continuing Grant (2016-2021) and engage the audience in roundtable discussions around this proposed research collaboration with IINSPIRE LSAMP Institutions.

USING STRENGHTSQUEST TO HELP STUDENTS DEVELOP A STEM IDENTITY – ROOMS 167-171

Faculty, Staff, and Professional Session

SPEAKERS

Ashley Lang, Wartburg College
LeAnn Faidley, Wartburg College

The Gallup StrengthsQuest and StrengthsFinder is a personality-test type survey that identifies a participant's unique combination of 5 of 34 Themes of Talent which can be developed into Strengths. Knowledge of these strengths can help an individual understand their identity and can be used by mentors and advisors to help students define their STEM identity. In this interactive session participants will explore the 34 Strengths and select 2 that they believe would be identified as their own strengths. They will then participate in a series of exercises that they could use with students to help them develop a STEM identity through the understanding their unique combination of Strengths.

10:00-10:50 AM (cont.)

LEVERAGING AN UNDERGRADUATE JOB INTO SOCIAL, PERSONAL, AND ACADEMIC SUCCESS – ROOMS 175-179

Student Session

SPEAKERS

Chad Harper, Grinnell College
Cora Touchstone, Grinnell College

Though undergrad is especially difficult for underrepresented students in general, STEM is particularly so; We have found that peer educating is a strong way to mitigate the social obstacles of studying STEM. We will be speaking about the dynamics of being a peer educator. Discussion will include: how peer educator work at the undergraduate level can be leveraged into post graduate opportunities, challenges of being a peer educator, and participants experiences of peer education as underrepresented students. The aim of this discussion is to encourage peer education among minorities and to highlight how doing so increases positive STEM identity. [P] To engage with the audience we will break into groups and engage in moderated discussion.

APPLYING FOR SCHOLARSHIPS – ROOM 275

Student Session

SPEAKER

Nancy Woods, Des Moines Community College

This session will provide information about numerous scholarships (i.e., FREE MONEY) that undergraduate students can get to fund their educational programs. Students will learn aboutseveral different scholarship avenues. Students will learn the importance of strong letters ofrecommendation and essay components. Hints and strategies will be provided! Reach for the BIG scholarships! There's money waiting for you!

11:00-11:50 AM

INTERSECTING IDENTITIES & STEM IDENTITY DEVELOPMENT – ROOMS 150-154

Faculty, Staff, and Professional Session

SPEAKER

Sarah L. Rodriguez, Iowa State University

Despite overall gains in the pursuit of higher education, students from diverse backgrounds remain underrepresented in STEM fields. This session will explore how institutions can utilize intersectional STEM identity development as a means to improving success for underrepresented minority students (URMs) in STEM. An intersectional approach is critical to avoiding oversimplifying or ignoring the complex identity experiences for URMs. Intersectionality calls for a greater consideration of the intersecting identities that students in STEM possess, highlighting the link between those individual identities and larger systems of marginalization and oppression. Intersectionality is not merely where multiple identities meet or a "sum of their parts" but rather the way in which identities interact and intertwine to form new, unique identity experiences for URM students in STEM.

11:00-11:50 AM (cont.)

TECHNOLOGY FOR AN ENGAGED CLASSROOM TO ENHANCE CRITICAL THINKING – ROOMS 167-171

Faculty, Staff, and Professional Session

SPEAKER

Savitha Pinnepalli, Marshalltown Community College

This presentation for faculty will incorporate free technology tools to create an interactive classroom. Hands on demonstration include Bravo Quiz, brainstorming using matchware and crossword compiler. Demonstration of Vex Cortex Robots and Office Software tips and tricks will be shared.

PREPARING AND APPLYING FOR GRADUATE SCHOOL – ROOMS 175-179

Student Session

SESSION MODERATOR

Vincent Rodgers, University of Iowa

PANELISTS

Thelma Harding, Iowa State University
Rodine Allen, University of Iowa
Franklin Bright, University of Iowa
Gwendolyn Fine, University of Northern Iowa
Valeria Ortega-Gomez, Iowa State University

This student session will have a panel of presently enrolled graduate students who can share their experiences and suggestions for applying to graduate programs. Students will be able to find answers to question like, "what program is best for me?" and "when should I apply?". Some of the topics of discussion will include the importance of the GRE and GRE subject exams, what to say in a personal statement, the quality of your transcript and how to approach faculty regarding recommendation letters. Faculty and students are invited to join in the discussion.

MAKING THE MOST OF YOUR RESEARCH EXPERIENCE – ROOM 275

Student Session

SPEAKER

Lori Adams, University of Iowa

Taking part in an undergraduate research experience plays a large role in cultivating a STEM identity. In this workshop, participants will learn strategies for maximizing the benefits of taking part in a research experience. Specifically, participants will:

1) Understand how research mentoring plays a crucial role in developing as a future scientist
2) Discuss strategies to deal with challenging situations that can arise in research groups
3) Learn the benefits of developing skill in communicating your research to diverse audiences

12:10-1:00 PM

Invited Lunch Speaker

ROOMS 167-179

Sunday Faronbi

Your Emotions Can Work For You

Do you recognize your emotions and why you're having them? Do you know their impact on you? On others? On your success in life? Do you know that your emotions are much more than those temper tantrums you have? Your level of emotional intelligence will go a long way to determine your success as a STEM professional.

There's a reason you react to situations the way you do. In this session titled "Your Emotions Can Work for You", Sunny Faronbi will take you on a journey to discover why you respond to situations the way you have until now. You will learn how to start using your emotions to enhance your relationships, both personally and professionally. You will discover how to work on improving your emotional intelligence so that it can work for you.

2:10-3:00 PM

STUDENT STEM IDENTITY PANEL – Thomas H. Benton Auditorium
All Attendees

SESSION MODERATOR
Queenster Nartey, Grinnell College

PANELISTS
Alfredo Colina, Grinnell College
Paul Faronbi, Iowa State University
Gwendolyn Fine, University of Northern Iowa
Lizeth Tamayo, Augustana College

This goal of this panel, comprised of current students and post-baccalaureate students in STEM, is to share their experiences and address questions through an interactive dialogue with current students. Some topics the panel will address include: how to better explain science to nonscientists, especially family members that are not familiar with the work but are an important support system, how to balance being a "working student" with part time jobs while taking a full load of classes, and discovering the intersectionality between STEM and other disciplines. The panel will dedicate most of the time answering student questions that can be asked anonymously if needed. Students are highly encouraged to ask questions that they have been struggling with because there is a good probability that someone else has the same problem.

THE EFFECT OF MAGNETISM ON ENHANCE PHASE CHANGE MATERIAL

Opeyemi Abass[1], Srilok Srinivasan[2]
[1]Des Moines Community College, [2]Iowa State University

Phase change materials (PCMs) have a large latent heat which makes it useful for potential applications like Latent heat thermal storage (LHTS) systems. In this regard, enhancing the thermal transport properties of PCMs will increase its efficiency. In this work, Fe3O4 nanoparticles (NPs) were dispersed into n-eicosane phase change material in order to explore its effect on the thermal transport properties in the presence of an external magnetic field. A homogenous mixture of molten n-eicosane and Fe3O4 NPs was prepared, and the thermal conductivity of the mixture is measured at regular intervals while allowing the mixture to cool down. It was found that the addition of Fe3O4 NPs results in a noticeable enhancement in thermal conductivity near the phase transition temperature of n-eicosane (36-38 oC), which can be attributed to the possible clustering effect of the nanoparticles. The thermal conductivity enhancement is found to be negligible at temperatures above and below the phase transition range. In the presence of an external magnetic field the Fe3O4 nanoparticles resists clustering which results in a relatively smaller enhancement in thermal conductivity of the composite. An experimentation of encapsulating the enhanced PCM was also carried out to observed the if the thermal conductivity will be effected or increase due to the stable form of enhanced PCM.

EXPANSION OF ALGINATE HYDROGELS ENTRAPPING SKIM MILK AND T4 BACTERIOPHAGE: ADDITIVES ADDED TO HYDROGELS TO EXAMINE EFFECTS OF EXPANSION AND DEGRADATION

Bishop Archer, Jamie Pryhubner, Erica Peterson, Rebecca Cademartiri
Iowa State University

Antibiotics have been the best option in eliminating pathogenic bacteria because they are easy and cheap to create. With the growing inefficiency of killing bacteria with antibiotics over time, bacteriophages are a possible replacement. Bacteriophages are bacterial viruses that occur naturally, and have high selectivity in their target host. Characteristics of bacteriophages are their rapid detection and that low concentrations are needed for treatment. E. coli 0157:H7 is a food borne pathogen that causes abdominal pains, malaise, dehydration, nausea, vomiting and bloody diarrhea in humans. This pathogen infects the intestines producing proteins that attack the inner walls. To destroy this E. coli, T4 bacteriophages encapsulated in alginate hydrogels are able to reach the intestines and deliver phage through oral consumption. The path is achieved due to the hydrogels resistance to gastric fluid in the stomach. The focus of this research was to examine if skim milk with a 5% w/v affects the expansion of alginate hydrogels of a concentration of 10% w/v. Results were collected by allowing hydrogels to dissolve in solution at incubation temperatures of 37o Celsius. Solution was then extracted and image scans were taken to show expansion. Results showed that for one-hour incubation of the hydrogels, the skim milk did not impair the expansion of the hydrogels in aspects of size or time of complete degradation. Hydrogels with and without skim milk, are non-existent within twenty-four hours allowing the bacteriophage to survive long enough to be released within the intestines (approx. 5-6 hours) before being dissolved.

WINTER COLD-HARDINESS IN NORTH AMERICAN TIGER BEETLES

McKenna Burns and Dr. Timothy Muir,
Augustana College

Insects in temperate or polar climates must display behaviors or physiological mechanisms to cope with low winter temperatures. Tiger beetles (Cicindelinae) range throughout North America and although their ecological role as insect predators has been heavily studied, almost nothing is known about their winter cold tolerance. For this reason, we measured three key indicators of cold tolerance, chill tolerance, freeze tolerance, and supercooling points, of adult Cicindela repanda and Cicindela limbalis during acclimation to winter. We also measured whole-body glycerol content and hemolymph osmolality. Our preliminary results suggest that both species are chill tolerant, but that they are not freeze tolerant. Significant lowering of the SCP was evident for C. repanda, with a median SCP of -9.0°C dropping to -11.2°C. Both species did accumulate modest glycerol; mean glycerol concentrations of C. repanda and C. limbalis were measured at 0.9 µmol/g and 1.5 µmol/g in early fall and 1.0 µmol/g and 1.4 µmol/g by mid-January, respectively. This initial assessment of winter cold tolerance suggests that adult tiger beetles can survive low temperature in the absence of internal ice formation and that the capacity of C. repanda to remain unfrozen increases in winter. The modest increase in glycerol content found in both species is too little for colligative cryoprotection, but it may protect the beetles

from low-temperature injury in other ways. Further investigation is needed to better understand the overwintering microhabitat of the beetles and how it may affect winter mortality.

BACTERIAL CHARACTERIZATION OF A HOG CONFINEMENT LOCATED IN POWESHIEK COUNTY AND A POTENTIAL SOURCE OF ANTIBIOTIC RESISTANCE BACTERIA DISCOVERED

Alfredo Colina and Dr. Shannon Hinsa-Leasure
Grinnell College

Previous researchers have discovered the presence of antibiotic resistant bacteria in the gut of hogs living in confinement operations. This raises concern as manure samples collected from these farms have displayed similar bacteria present. Further, manure collected serves as fertilizer to be spread in crop fields. This widely used practice generates a path for antibiotic resistance bacteria to enter the environment. In order to determine if antibiotic resistance bacteria is present in a confinement located in Poweshiek County, we gathered manure and soil samples to be assessed using a disk susceptibility test. In addition, polymerase chain reactions were used to determine antibiotic resistance genes that could be present in these environments. Antibiotic resistance was found in manure and soil sample isolates tested against ampicillin and tetracycline among other gram-negative antibiotics. Different antibiotic resistance profiles were found for E. coli isolates in the soil and manure samples. Therefore we concluded that there is possible evidence of antibiotic resistance spreading beyond the manure pit, specifically for ampicillin.

GROWTH OF ADULT HIPPOCAMPAL PROGENITOR CELLS AT A REDUCED TEMPERATURE

Ana D. Collazo Martinez[1]1, Elizabeth J. Sandquist[2], Bhavika B. Patel[2], and Donald S. Sakaguchi[2]
[1]Undergraduate Major in Genetics Iowa State University, [2] Department of Genetics, Development and Cell Biology, Iowa State University

Neurogenesis from adult hippocampal progenitor cells (AHPCs) is essential for normal brain development and maintenance. In order to understand neurogenesis, it is important to understand the nature and plasticity of mammalian AHPCs. A major challenge when studying mammalian systems is the cost associated with in vivo studies. Zebrafish have many advantages as a vertebrate model system including its affordability and small size compared to common mammalian animal models (e.g., mice or rats). Currently there is no standard method for mammalian AHPCs xenotransplantation in zebrafish. It is in our interest to develop a zebrafish xenotransplantation model for mammalian AHPCs. One of the challenges with this model is the temperature difference for their optimal incubation. While mammalian AHPCs grow optimally at 37°C, zebrafish embryos grow optimally at 28.5°C. In this study the effects of a reduced temperature culture on the proliferation and survival of AHPCs in vitro was assessed. AHPCs were cultured at a reduced temperature of 34°C, and compared their proliferation and survival to a control group cultured at a temperature of 37°C. A reduction in the total number of cells was observed at a reduced temperature of 34°C compared to the control. However, AHPCs proliferation and progenitor status, measured by nestin immunolabeling, was not dramatically different between the treatment groups cultured at the reduced temperature of 34°C and the controls cultured at 37°C. These results suggest AHPC cell cycle may be slowed when cultured at a reduced temperature, but not overall affected in a manner that hinders its progenitor status and ability to proliferate.

INVESTIGATION OF GENERATING UNIFORM COATINGS OF MICROPARTICLES BY CONVECTIVE EVAPORATION IN CONJUNCTION WITH ELECTRIC FIELD

Joshua Curtis-Beard, Sahar Andalib, Dr. Daniel Attinger, Dr. Jamie Juarez
Iowa State University

Particle deposition is the bond particles have to surfaces. The idea to have a uniform coating of microparticles is to facilitate particle deposition with self-evaporative flux.
This project explores the concept of self-evaporative flux between two plates with a constant velocity. This project found that at optimal velocity, uniform coatings of micro particles can form monolayer coatings over surfaces. This project also further analyzes the evaporative flux between two plates with the application of electric field between the same plates. The experiments were tested with different voltages and frequencies to see the effects of the microparticles due to the electric field. The experiment found the optimal value for the voltages and frequencies to make the microparticles move in a desired motion.

ANALYSIS OF STRAIN SENSING CAPABILITIES IN CONDUCTIVE PAINT CEMENT SENSOR

Akira DeMoss, Simon LaFlamme, Irvin Pinto
Iowa State University

To improve safety conditions and reduce unscheduled maintenance costs of concrete infrastructure, there is a pressing need to diagnose performance issues and resolve problems before they lead to failure. Recent advances in the field of nanotechnology have enabled Structural Health Monitoring smart material innovations. The objective of this research is to determine the effect of a poly-Styrene-co-Ethylene-co-Butylene-co-Styrene (SEBS) polymer matrix on highly conductive Carbon Black dispersion throughout a novel piezoresistive concrete sensor. Twenty-six samples with varying amounts of SEBS and Carbon Black were tested by implementing a uniaxial compression test apparatus to analyze electrical signals under varying torques. Torques of 10ft-lbs, 15ft-lbs, and 20ft-lbs were applied for 120 seconds each, and dynamic signals analyzed. Findings showed that adding the SEBS polymer reduced percent change in signal slope by up to an order in magnitude. This implies that less carbon black is needed to produce desired strain sensing.

IMPLEMENTATION OF A LABVIEW APPLICATION IN A TIME-SCALED RAMAN SPECTROSCOPY SETUP

Cheikh Diallo[1], Di Cheng[2], Joong Mok Park[2] and Jigang Wang[2]
[1]Des Moines Area Community College; [2]Iowa State University

Raman scattering is the inelastic scattering of a photon upon interaction with matter. The reason for Raman spectroscopy techniques is to utilize that effect to further our understanding of materials' properties. Because of the emission of photoluminescence by samples, the acquisition of the Raman spectrum may require an advanced technique named time-gated Raman spectroscopy. A monochromator is used to select wavelengths and a detector to acquire data. Without a proper application, those tasks become extremely lengthy, time-consuming, and very susceptible to errors. For a range of wavelengths, the designed application collects data representing the evolution of intensity of the signal in a time scale. In order to obtain the final Raman spectrum, the application integrates the data for a constant duration for each wavelength. Finally, an intensity of Raman signal vs. wavenumber shift graph is obtained. That graph, called Raman spectrum, varies for different materials. It is therefore referred as materials' fingerprint and is widely used to identify molecules. In our lab, the software was used to better learn about perovskite materials. It can be used to improve researches in various fields; in medicine Raman spectroscopy permits a real-time monitoring of anesthetic and respiratory gas mixtures during surgery.

INVESTIGATING STRUCTURAL AND OXIDATION CHARACTERISTICS OF MO-BASED HIGH ENTROPY ALLOYS

Mouhamad Diallo, Aayush Sharma, Dr. Pratik Ray, Dr. Ganesh Balasubramanian
Iowa State University

High-entropy alloys (HEAs) are multiple principal elements in equimolar or near equimolar ratios which contains at least 5 principal atomic concentrations between 5 and 35 %. HEAs containing Molybdenum (Mo) are known for their high-temperature strength and superior corrosion resistance. In the present work, we aim to characterize Mo-based HEAs (quaternary and quinaries like Mo-Ta-W-Ti-Zr) to analyze phase stability, structural characteristics and oxidation behavior. First homogeneous material casting experiments would be carried out to make the alloys at desired concentration which would then be subjected to techniques like x-ray diffraction (XRD) to analyze structural characteristics. Further investigation of thermal transport properties will also be conducted in order to determine the nature of the heat transfer mechanism present.

DETECTING CONCENTRATIONS OF STEROIDAL HORMONES IN WATER SAMPLES THROUGH OPTIMIZED SPE/ UHPLC/MS METHOD

Glorianne Dorce, Andrew Graham, and Elaine Marzluff
Chemistry Department, Grinnell College

Steroids, like estrogens and androgens, can be released into water from residential and farming areas resulting in release of endocrine disrupters to water supplies. Quantitative methods with low detection limits are necessary to distinguish steroidal contaminants that elicit harmful effects to aquatic organisms. We here report on a solid phase extraction/ ultra-high pressure liquid chromatography/ mass spectrometry (SPE/UHPLC/MS) method to detect androgen and estrogen hormones at low ng/L levels. Instrument calibration for androstenedione and testosterone was linear over

three orders of magnitude from concentrations around 5 X 103 ng/L to 5 X 105 ng/L. Samples concentrated 2000X by SPE had a detection limit of ~2.5 ng /L for an instrument detection limit of ~ 5 x 103 ng/L. This is well below the median concentration (116 ng/L) reported for testosterone in US streams (Kolpin, D. et al., 2002). Solid phase extraction provided a range of 64 to 94 % recovery for both androstenedione and testosterone, and appeared relatively independent of matrix type. Future work will involve developing an internal standard for true quantitative work.

OPA-1 PROCESSING IS ALTERED BY CALORIC INTAKE

Sean Easler, Serif Bacevac, Rose McGlauflin, Antentor Othrell Hinton, Jr., Ph.D. 1
Renata O. Pereira, Ph.D. , E. Dale Abel, M.D.,Ph.D.
University of Iowa

Diabetes affects 29.1 million people in the United States, and another 86 million have prediabetes. Type 2 diabetes (T2DM) has been linked to a reduction in the function of mitochondria, which are important components of all cells that generate the energy that fuels normal cellular function. Notably, Type 2 diabetes has been associated with increased consumption of high fat diet (H.F.D). H.F.D. consumption can lead to metabolic stress in the mitochondria, insulin resistance, and can alter processing of important proteins in the mitochondria. It has been established that the GTPase, OPA-1 (Optic Atrophy 1), which has a key role in regulating inner membrane fusion and overall metabolic function of mitochondria, has isoforms that can be altered under stress by an enzyme called OMA1. However, it has not been shown what metabolic stresses, such as caloric intake, sex steroids, or inflammation can alter processing of OPA-1 and if they can alter the levels of enzymatic processing proteins. Therefore, we hypothesize that the processing of OPA1 is altered by increased caloric consumption, sex steroids, or inflammation. Western blot analysis determined protein levels of OPA-1 isoforms from HFD samples. Then, we used transmission electron microscopy (T.E.M.) to analyze the morphological differences between normal chow (N.C.) and H.F.D. mitochondria. We demonstrated that H.F.D. leads to processing changes of OPA-1 and T.E.M. analysis revealed that mitochondrial morphology changes in the skeletal muscle. To conclude, preliminary data indicates a link between the processing changes of OPA-1 and H.F.D.

SHAPING WATERSHEDS

Emma Gallegos[1,2,] Dr. Sunday Tim[1], Dr. David Weber[1], Dr. Steven Mickelson[1]
[1]Iowa State University, [2]Des Moines Community College

Creating a new kind of learning environment utilizing augmented reality technology and bringing more hands on learning into the classroom. The augmented reality sandbox can show and teach topographical maps, landscapes and has the ability to simulate real water. A physical sandbox in the classroom can encourage young students to explore and learn while also having fun! All ages can benefit from learning about things like the water cycle and simulating natural disasters like a dam breaking.

IOWA STATE UNIVERSITY GRAIN QUALITY LABORATORY APPROACH AND METHODOLOGY FOR ELIMINATING DEFECTS FOR A SUSTAINABLE QUALITY CONTROL & OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM

Ria Gasaway[1], Charles Hurburgh PhD[2], Glen Rippke[2].
[1]Industrial Technology, Iowa State University; [2]Agricultural & Biosystems Engineering, Iowa State University

Expansion of the laboratory along with sophisticated and innovative research prompted the Grain Quality Laboratory to significantly update procedures and protocols in management areas. Which includes Health and Safety Program, Laboratory Procedures and Processes, documentation, inventory, and traceability for all functions of the system.

Quality control tools and improvement process systems were used to develop a sustainable integrated quality and occupational safety management system for the Iowa State University Grain Quality Laboratory. The quality management program was designed to be sustainable with cost and time efficient updates.

Health and safety programs are an important part of preventing injury and illness in the workplace. Iowa State University Grain Quality Laboratory's existing program of 2005 expired, due to expansion of the laboratory and high turnover rates. Industrialized corporations benefit from quality control tools and improvement processes to prolong the health of their industry. A laboratory setting is no different and can be modeled the same way as an industry with occupational safety management, quality control tools and improvement processes.

DEVELOPING AND EVALUATION GRID SEARCH METHODOLOGY TO DETERMINE THE DEAD TIMES IN MULTIPLE INPUTS DYNAMIC MODELING

Taha Gesalla[1], Derrick k. Rollins [2,3], and Yong Mei[2]
[1]Des Moines Area Community College (DMACC); [2]Department of Cchemical and Biological Engineering, Iowa State University; [3]Department of Statistics Iowa State University

Continuous-time glucose monitoring (CGM) conclusively improves glucose control by providing frequently sampled information that allows the user to associate changes in their glucose levels with changes in their behavior by using Block-oriented modeling (BOM) which is a multiple-input modeling approach for nonlinear dynamic processes. Current implementation of BOM into feedforward control (FFC) results in linearization of the model and decomposition into separate components for each input. This work presents a multiple-input BOM FFC approach that does not linearize and decompose the BOM into separate components for each input. This implementation uses a new FFC law that uses the complete BOM in the time domain. The approach is demonstrated with a Wiener model for a simulated continuous stirred tank reactor (CSTR) with four (4) measured inputs. The Wiener model is nonlinear in the physically-based dynamic parameters of the transfer functions and linear in the static parameters of the static gain function. The static gain function has a second order linear regression form with interaction and quadratic terms. The Wiener model is built under open-loop conditions using a Box-Behnken statistical experimental design consisting of 27 sequential step tests. Under a sequence of multiple input changes, the addition of this feedforward controller to the feedback controller reduced the standard deviation of the controlled variable from its set point by 70% in comparison to the response with only feedback control.

BIOGEOCHEMICAL EVOLUTION OF THE ATMOSPHERE: THE BETA PROJECT

Steven J. Gomez, Jose R. Lopez, Brittnie Dotson, Carissa Herkelman, Bobbi J. Minard, Kathryn E. Patrick, Jessica Wayson, Joshua A. Sebree, Alexa R. C. Sedlacek and Xinhua Shen
University of Northern Iowa

This project, due to the immense span of time it covers, has been separated into three sections. Each section covers a different point in Earth's history: the atmosphere of present-day Earth (modern agricultural sources of atmospheric NH3), during the Devonian Period in Earth's history (forest ecosystems radiated onto the land surface and caused major CO2 drawdown), and during the Archean and Proterozoic eons in Earth's history (before and during the oxygenation of Earth's atmosphere).
Our interdisciplinary team is comprised of the following: Undergraduate Earth Science, Environmental Science, Biology, Chemistry, and All Science Teaching majors from UNI. The research Faculty includes Earth and Environmental Science Department, Chemistry and Biochemistry Department at UNI and collaborators from NASA Goddard Space Flight Center.

THE ISOLATION AND ANALYSIS OF TWO BACTERIOPHAGES

Talitha Harrington, Emily Saxton
Nebraska Wesleyan University

This research oriented course began with a soil sample retrieved by each student. Students enriching each soil sample to increase chances of a viable bacteriophage and tested their possible virus with a bacteria cultivated in the NWU lab, Microbacterium paraoxydans NWU1. As lab work continued, students studied chapters strategically chosen from various textbooks to increase the understanding of the virus being cultivated.

PARTNERING IN ANIMAL WELFARE SERVICE (P.A.W.S): AN EFFORT TO IMPROVE THE LIVES OF ANIMALS THROUGH ENGINEERING APPLICATIONS

Christian Hernandez, Christopher Hernandez, Dr. Caroline Krejci, Dr. Richard Stone
Iowa State University

Many animal shelters are left with limited options when they experience overcrowding in their facilities. The number of animals that enter animal shelters is approximately 7.6 million. In order to combat the issue of overcrowding, many shelters resort to euthanasia, or they simply deny them. In our program, we gathered data on local shelters, rescues, sanctuaries, fosters, and transports. In order to gain a detailed understanding of capacity, interaction capabilities, and the needs within the animal rescuing community, our work consists of the development of the first agent based model

specifically designed to aid in the distribution in the care of animals in need. In addition to developing this model, we performed direct contributions to increase capacity in a number of locations in Iowa. This work is combining the theoretical and direct applications of engineering to make a real difference for homeless animals.

NANOMEDICINE FOR TARGETED CANCER THERAPY

Myra James[1], Po-Han Chao[2], and Dr. Yunching Chen[2]
[1] *Department of Mechanical Engineering Iowa State University*
[2] *Institute of Biomedical Engineering, National Tsing Hua University, Hsinchu Taiwan*

Dr. Chen's research is focused on the investigation of nanomedicine as a method to combat cancer. Nanomedicine has many advantages compared to traditional pharmaceuticals; such as the ability to target specific areas, and reside in the body for longer lengths of time. Biology methods and protocols such as: cell culturing, tumor implantation/ extraction, perfusion of mouse, and western blot were used in the lab. Research to develop the nanomedicine is ongoing and still in progress.

SYNTHESIS OF SULFONAMIDE ALCOHOL LIGANDS

Jordan Keeton, Grant Benthin, Bradley Chamberlain
Luther College

Biodegradable polymers made from renewable resources (e.g., starch, cellulose, lactic acid) are a fundamental part of sustainable commercial technologies; these technologies, in turn, diminish environmental hazards stemming from the growing demands of industrialized society for carbon-based chemical processes. Much advancement has been made in the field of biodegradable polymer development. Polylactide (PLA), one of the most successful advancements, is a polyester with substantial potential in fiber, film and packaging uses; it is synthesized by a ring-opening polymerization (ROP) of D,L-lactide, a cyclic ester commonly derived from fermentation of corn or sugarcane. In recent years, considerable effort has been put into the development of catalysts for regulating the synthesis of PLA. These catalysts are important because they control the rates of polymerization and the three-dimensional orientation of substituents along the polymer chain. Many of the catalysts currently used in the synthesis of PLA consist of organic molecules coordinated to a metal center. Metal-based catalysts are often associated with certain levels of toxicity and conductivity that make current PLA undesirable for biomedical and micro-electronic applications. In hopes of avoiding these undesirable properties, a small library of sulfonamide molecules was prepared. This set of ligands catalyzed the ROP of lactide in the absence of metal with appreciable rates. Changes in the ligand architecture affected the rates in a predictable manner. Specifically, sulfonamide ligands with the strongest electron withdrawing groups displayed the fastest rates, as the catalyst bonds more strongly with the monomer, thereby activating it towards polymerization. In order to further probe the effect of the sulfonamide architecture on the rate of polymerization, as well as on the structure of the resulting polymers, we have prepared an expanded library of sulfonamide catalysts that contains a broader range of electronic and steric properties. Herein, we report the synthesis of characterization of this new library.

LATINO MEN'S HEALTH SYSTEMATIC LITERATURE REVIEW (PUBMED)

Brian Leal, Jason Daniel Ulloa PhD
University of Iowa

Latino men suffer from disproportionate rates of depression, substance abuse, and in Men who have sex with men (MSM) higher risks of HIV contraction. We conducted a literature review to find all the articles in Pub Med related to Latino Men's health behavior. Out of 1732 articles only nine were related to behaviors that contribute to Latino men's health. Of those nine, all found varying degrees of influence that acculturation and culture have on aforementioned health issues. The literature review highlights both literature and health disparities that a segment of one of the fastest growing population (Latinos) face. More research is needed to understand the effects that culture has on health behaviors.

ALS-ASSOCIATED GENE FUNCTION IN MOTOR NEURONS EXAMINED BY CRISPR/CAS9 GENOME EDITING IN THE ZEBRAFISH DANIO RERIO

Gabriel Maldonado
Iowa State University

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease characterized by the deterioration of motor neurons. Recent sequencing projects have uncovered new genes with mutations that are linked to familial or sporadic cases. The identification of these genes provides an opportunity to better understand the underlying mechanisms of the disease. The current challenge is to understand the in vivo function of these genes, with the hope that this insight will shed light on their connection to ALS pathology. To begin to understand the roles of these ALS-associated genes, we have chosen to first examine their expression using in situ hybridization. We have identified a number of genes with expression in various regions of the central nervous system, including in motor neurons. Upon identifying those genes with selective expression in the nervous system, we are using genome editing technology to engineer mutations in the zebrafish. To begin our investigation of ALS-associated gene function, we have utilized clustered regulatory interspaced palindromic repeats (CRISPRs) to engineer targeted mutations in a number of these ALS-linked genes in zebrafish. In these ongoing studies, we are characterizing fish homozygous for the different CRISPR-induced mutations. Additionally, to more easily visualize any motor neuron defects, we are also crossing these mutants into an mnx1:GFP transgenic background. The presence of the GFP will enable us to observe the effects of protein loss specifically during motor neuron development and, we hope, ultimately reveal how their dysfunction leads to motor neuron death.

WATER QUALITY STUDY FOR MICROCYSTIN DETECTION USING COLORIMETRIC GOLD NANOPARTICLES

Deves Mohan
Iowa State University

This research study is intended to produce a quantitative and easy-to-use colorimetric assay to monitor cyanobacteria contamination in drinking water, by determining the presence of the microcystin. Cyanobacteria can form blooms in water, and release microcystin toxins which have been confirmed to cause human and animal poisonings with its contamination of drinking water. Microcystin-LR (MCLR) has been identified as the most toxic and common microcystin, which this study aims to detect within its WHO provisional guideline of 1 uM using the properties of gold nanoparticle (AuNP) based assays. The major advantage of AuNP-based assays is that the assay result can be observed by the naked eye, and therefore, no sophisticated instruments are required. A well-dispersed AuNP solution is red in color, whereas aggregated AuNPs appear as a blue (or clear) color. If MCLR is detected, the solution will aggregate and produce a blue color, otherwise, it will produce a red color. This AuNP and aptamer based assay produces a colorimetric detection of 0.37 nM, far within the WHO guideline. Improved detection is intended to be made available through a smartphone-based readout system.

EVALUATING THE HYDROLOGIC EFFECTS OF STREAM SEDIMENT DYNAMICS

Billy Noy[1], Ahmed Gesalla[1], Dr. David Webber[2], & Dr. Steve Mickelson[2]
[1]Des Moines Area Community College Ankeny Campus; [2]Agricultural & Biosystems Engineering, Iowa State University

Progress in understanding the physical and geomorphological process associated with sediment transport and streambed erosion has been significant in the last several decades and has witnessed huge advances in laboratory, field, and numerical investigation. Laboratory flume studies have been used to evaluate and understand the fundamental process controlling the transport and distribution of sediments in streams. Sediments dynamics experiments utilizing laboratory flumes are extremely useful as they allow observation of flow problems and particle concentration, as well as a complete control of the physical and geomorphological conditions in the stream and streambed. This paper summarizes the present state of research to determine the hydrologic effects of the different types of simulated streambed sediment loads. By simulating streamflow sediment loads and streambed conditions may be feasible to partition and quantity the sediment/phosphorus sources between cropland and streambed substrates. Using databases such as ScienceDirect and Scopus in tandem with the standard literature review process (e.g. collect, know, comprehend, apply, analyze, synthesize, and evaluate), we reviewed studies on streambed erosion and suspended sediments sources and transport in stream. The results show that the different ways researchers identify sediment sources and how different human activities (e.g. deforestation, agriculture, and urbanization) contribute to the problem of stream incision,

streambank erosion, and sediment pollution. Future research should involve both laboratory and field experiments to examine suspended response to crop production practices at different spatial scales.

INVESTIGATING COOPERATIVITY BETWEEN THE ZBTB18 TRANSCRIPTIONAL REPRESSOR AND PRB TUMOR SUPPRESSOR IN NEURAL DEVELOPMENT AND BRAIN TUMOR PATHOGENESIS

Valeria Ortega-Gomez, Laura E. Schultz, Staci L Solin, Jeffrey A. Haltom, Melanie E. Torrie, and Maura McGrail
Iowa State University

The decision to adopt a specific fate is a fundamental property of cells during animal development that involves the coordinated suppression of genetic programs to limit division and activation of genetic programs to promote differentiation. Both processes of proliferation and differentiation are disrupted in malignant human cancer. The ZBTB18 gene encodes a transcriptional repressor that is known to regulate neural progenitor proliferation, neural differentiation and neuronal migration in the developing mouse brain (Baubet et al., 2013; Hirai et al., 2012). The goal of this project is to test the hypothesis that ZBTB18 cooperates with the pRB tumor suppressor to regulate genetic programs that ensure proper neural progenitor proliferation and differentiation and suppress brain tumor oncogenesis. Our lab has recently shown that somatic inactivation of the pRB tumor suppressor leads to highly proliferative brain tumors in adult fish with features of primitive neuroectodermal tumors (Solin et al., 2015). The tumors appear to originate from proliferative zones where ZBTB18 is expressed in normal brain. Transcriptome analysis of pRB-defective tumors shows the level of ZBTB18 gene expression is down >10 fold. Together these data support the hypothesis that ZBTB18 cooperates with pRB to regulate neural progenitor proliferation and suppress tumor formation. Our hypothesis predicts that mutations that disrupt ZBTB18 function will enhance the pRB mutant phenotype, leading to increased numbers of proliferating cells in the brain of pRB rb1/rb1 homozygous mutants. To test our hypothesis we will target mutations to ZBTB18 gene zbtb18 in rb1/rb1 mutant zebrafish embryos using CRISPR/Cas9 genome editing. The number of proliferating cells will be measured in larval brain tissue sections of targeted animals and compared to the number in non-targeted pRB rb1/rb1 homozygous mutants. These studies will provide insight into the mechanism by which pRB suppresses tumorigenesis through control of gene expression programs that limit proliferation and promote neural differentiation.

PREPARATION OF SENSORS FORMULATIONS FOR OVERHEAD DEPOSITION ONTO NANOPOROUS SURFACES

Anais Quossi, Andrea E. Holmes, Michael Kangas, Rachel M. Lukowicz, Adreanna Ernest,
Department of Chemistry, Doane University

Quick identification of chemical substances in tactical areas is critical. Colorimetric arrays have shown great potential to detect drugs and chemical warfare agents such as explosives, nerve agents, and toxins. Bulk screening was performed to determine which colorimetric sensors are best suited for particular analytes. 131 sensors were tested in solution in order to select the ones that uniquely identify the analytes. A variety of analytes were selected that serve as mimics of nerve agents, explosives, and toxins. Images of the arrays were obtained through scanning, and then analyzed for RGB values with ImageJ followed by chemometric methods. The best sensors were used for printing on paper-like substrates in order to make the technology portable and user-friendly.

1985 MEXICO CITY EARTHQUAKE CRUCIAL FACTORS

Enrique Rubio Delgado
Iowa State University

The purpose of this research is to identify the effects of the 1985 Mexico City earthquakes on the city's buildings. It is imperative to be able to estimate the manner of how a building will behave; given that 84% of America has a reasonable chance of experiencing infrastructure damage from an earthquake in 50 years. Given that the 1985 Mexico City earthquake encountered unique ground motions I would like to identify the characteristics of the buildings construction that gave way to failure on certain sections or complete collapse. Extensive literature review has been done to arrive at conclusions. The most crucial factors for the buildings' poor performance was concluded to have been the geologic factors of Mexico Citi's subsoil and the poor regulation of earthquake readiness.

FORMATION OF ETHANOL DROPLET MICROARRAY ON AN OIL-COATED POROUS POLYMERIC HYDROPHILIC-HYDROPHOBIC SURFACE

Jasmin Sandoval, Ivana Pini M.S., Dr. Andrea Holmes & Dr. Pavel Levkin
Doane University & Karlsruhe Institute of Technology: Institute of Toxicology & Genetics

Confining organic solvent dispersion specifically to the hydrophilic areas of the HEMA-EDMA porous polymer would enable the use of the surface for high-throughput small scale organic reactions, studying small model biofilms, and bacteria communication across liquid boundaries. This research aimed to develop a method of forming a micro array of ethanol droplets on UV-patterned HEMA-EDMA porous polymer surfaces containing hydrophilic-hydrophobic regions. Due to the low surface tension and oleophilic properties of the porous polymer, organic solvents disperse on all areas of the HEMA-EDMA. Applying Krytox oil to the porous polymer, creates regions of slippery-liquid infused porous surface (SLIPS) as the hydrophobic perfluoropolyether selectively locates in the hydrophobic regions. This prevents organic solvent dispersion on hydrophobic areas of the surface allowing for the separation of the organic solvent into specific regions. The final result is a micro array of ethanol droplets in the hydrophilic areas of the polymer which are surrounded by Krytox-coated hydrophobic areas. In the future, these surfaces will be used as part of a microfluidic set-up to study neural cells when exposed to pharmaceutical.

WOODCHIP BIOREACTOR TRACER STUDY

Alexis Slade
Iowa State University

Reducing nitrate export from the upper Midwest is important to maintaining and improving the quality of our waters, locally, nationally and globally. To evaluate the bioreactor flow and dispersion characteristics, a potassium bromide (KBr) tracer test was conducted on field sites in Iowa located in Wright, Greene, Polk, Story, and Washington counties. The objective is to review the data to identify hydraulic flow patterns of the bioreactors. Upon analysis, this system may be beneficial to further improved designs and performance of woodchip bioreactors.

IDENTIFYING NOVEL GLIA MARKERS IN THE ZEBRAFISH ENTERIC NERVOUS SYSTEM

Remi Smith, Kendra Clark, Julie Kuhlman
Iowa State University

The enteric nervous system (ENS) is the largest subdivision of the peripheral nervous system that functions to control the gastrointestinal tract. Enteric glia function in maintaining the intestinal barrier lining and supporting enteric neurons. We are interested in determining markers to identify glia in the larval zebrafish ENS. Preliminary studies suggest that the accepted zebrafish specific marker for glial fibrillary acidic protein (GFAP), the antibody zrf1, used to identify glia in other tissues may not be specific to glial cells in the gut but may be labeling another cell type in the intestine such as smooth muscle. To identify antibodies morespecific to glia in the gut, we are screening a panel of antibodies including GFAP and other glial proteins. Our antibody screen also requires testing and modifying current immunohistochemical (IHC) protocols. IHC modifications we tested included types of tissue fixative, length of tissue fixation, and whether sectioning or removal of the skin can achieve improved antibody accessibility and better staining of the tissue. Colourless, a mutant zebrafish line presumed to lack enteric glia was used to test for the specificity of glia markers after the establishment of the markers in wild type fish.

FAST ALGORITHMS FOR RECOMMENDER SYSTEMS

Omar Taylor, Chinmay Hegde, Souparni Agnihotri, Charles Hubbard
Iowa State University

The problem of designing a recommender system for predicting future user preferences is receiving considerable attention with the importance of user/data mining becoming a growing trend in many areas as the years go by. The potential to understand user data and its behavior has many applications ranging from recommending movies, music, and news to economics, human computer interaction (HCI), restaurants, and life insurance. A good recommender system, however, requires a good algorithm, and with an algorithm only being as good as the data it leverages, it is necessary to apply our research to a particular area in order to gather and assess this data. To approach designing our recommender system, we are opting to apply our research to recommending cuisines/recipes. To prepare the research environment,

we are configuring a server machine to properly handle request and responses to the application – using javascript for both the frontend and backend – and are leveraging a noSQL database as a means of hosting and storing user and application information. To begin collecting user feedback and interaction with the food application, the application relies on the results of a web crawling API that gathers and stores food recipes into our database. Additionally, the application allows users to authenticate themselves into the application and begin providing feedback to a set of recipes via a number of front-facing screens. An Android version of this application is currently in development and will be our primary method of gathering and assessing data with our algorithms.

THE INFLUENCE OF ACTIVATING VERSUS RELAXING MUSIC ON REPETITIVE FINGER MOVEMENT AND ASSOCIATED MOTOR CORTICAL ACTIVITY

Kiearrah Williams[1], Elizabeth Stegemöller[2], Patricia Izbicki[2]
Department of Kinesiology, Iowa State University[1]; Department of Neuroscience, Iowa State University[2]

Music is a therapeutic attribute that has been shown to differentially affect movement performance and associated brain activity in healthy adults. Given the integration of both sensory and motor aspects with music, it remains unknown if sensory integration is also modulated by the style of music. Thus, Tthe purpose of this study was to examine associated sensory integration movement performance and associated motor cortical activity while moving to different styles of music at two different rates in young healthy adults. 32 healthy young adults were asked to perform an unconstrained finger flexion-extension movement in time with a tone only and in time with two music conditions: relaxing music and activating music. Two rates, 70 beats per minute (BPM) and 140 BPM, were presented for each condition. A metronome click in the music conditions ensured participants were tapping at the correct rate. Finger movement was measured using a 2 mm sensor placed on the index finger, and bipolar surface electromyography (EMG) was recorded from the first dorsal interossieous (FDI) and the extensor digitorum communis (EDC). Electroencephalography (EEG) signals were recorded from a montage of 64 scalp-surface electrodes during rest and movement conditions. Kinematic and kinetic data were obtained from the sensor and EMG. Movement onsets were manually obtained. EEG signals were epoched relative to movement onset. Epochs were then collated for all trials across each tone rate and condition. Analysis of event-related power focused on parietal-sensory integration areas (i.e. electrodes P3 and P4) was completed, and power in the alpha band (8-12 Hz) and beta band (13-30 Hz) was obtained and normalized to rest. Results revealed power was greater in the beta band for activating music compared to relaxing music indicating that activating music modulates the motor corticalsensory integration activity region more than relaxing music. These results suggest that style of music should be considered when developing interventions that use music to facilitate movement, such as in Parkinson's disease.

SOIL NO (NITRIC OXIDE) AND N2O (NITROUS OXIDE) EMISSIONS ARE AFFECTED BY MOISTURE CONTENT

Jerry Young Bear, Wenjuan Huang, Steven Hill
Department of Ecology Evolution and Organismal Biology, Iowa State University

Temperate agricultural soils are important sources of reactive nitrogen gases.
Nitric oxide (NO) contributes to smog formation. Nitrous oxide (N2O) is an important greenhouse gas with a warming potential approximately 300 times greater than carbon dioxide. The microbial processes of nitrification and denitrification in the soil both can produce these gases. These processes are sensitive to soil moisture content. Moisture is highly variable in Iowa soils and is likely to be affected by future climate change.

We asked how variation in soil moisture affected production of NO and N2O from an Iowa agricultural soil under laboratory conditions. Dry soils produced large amounts of NO, a gas that has received very little study in our region. Fertilizer addition strongly increased the production of both NO and N2O during our experiment. Nitrogen assimilation by plants may have important impacts on emissions of these gases. Future work should focus on how amount, timing, and depth of fertilization impacts production of these gases.

UTILIZING PAPER MICROFLUIDICS IN THE DESIGN OF WEARABLE BIOSENSORS

Erik Zorrilla[1], Aniebiet-Abasi Akpan[2] and Rocio Garcia[3],
[1]Department of Biology, Upper Iowa University; [2]Department of Chemistry, Carleton College; [3]Department of Computer Science, Dominican University

Modern biosensing technology has applications across many fields including agriculture, mining, health, and fitness. However, the products currently available do not utilize the full potential of the technology. There are not many marketable designs that are affordable, user friendly, and capable of delivering accurate, onsite readings.
The purpose of our work was to successfully fabricate a lateral flow assay (LFA) prototype for a wearable biosensor that would measure the levels of lactate present in human sweat. The primary variables were the width of the flow assays channels, the volume of the well, and the arrangement of the paper pumps. The optimal result would be a design that transferred a target flow rate of sweat through the LFA to each well over a consistent period of time. A paper microfluidic approach was implemented in the design allowing for a cheap and possibly disposable product.

CROSS RESISTANCE TO ANTIBIOTICS IN ARTIFICIAL SELECTION OF MORAXELLA CATARRHALIS

Raissa Zuim Dantas, Tyler Winterstein, Dr. Jeffrey Isaacson
Nebraska Wesleyan University

Antibiotics can be bactericidal, kills bacteria, or bacteriostatic, stops bacteria from growing. Antibiotics work against bacterial infections and are separated into classes. However, through series of expositions of bacteria to the same antibiotic, it can present some mechanism which provides its resistance against different types of antibiotics with similar mechanisms of action or can affect across different classes of antibiotic, this is called cross resistance bacteria.

Through a poster I would like to present how Moraxella was artificially selected in hope of creating more resistant strains of bacteria. Artificial selection was used in both Kirby Bauer and Minimum Inhibitory Concentration (MIC) tests by exposing them to the antibiotics available, to see if it could actually be created bacteria that could become resistant to other types of antibiotics. I would like to demonstrate and explain that if taking antibiotics for precaution or at the wrong concentration, they can acquire the bacteria. Therefore, they might not be prevented from the infection, in fact show they could be developing a more resistant that can be also resistant to other antibiotics.

ASSOCIATION OF UNIVERSITIES FOR RESEARCH IN ASTRONOMY (AURA)

The IINSPIRE LSAMP Program, in partnership with the Association of Universities for Research in Astronomy (AURA), will offer internships during 2017. This program is intended to provide students with work and research experience in a major astronomical observatory. Although all applicants will be considered, special consideration will be given to engineering and computer science students. In addition, applicants are expected to have course work and experience that will enable them to contribute to the work of the observatory.

Intern positions encompass the entire range of technical and scientific skills involved in operating modern observatories. To accomplish research in astronomy using the most advanced telescopes, the staffs of AURA's observatories include electrical engineers, mechanical engineers, optical engineers, software engineers. These engineers work in partnership with our scientists and participate in the end-to-end development of some of the world's most advanced astronomical instrumentation. The experi- ence gained by students in the learning and research environment we offer would be broadly applicable in a number of industrial settings as well.

The Association of Universities for Research in Astronomy (AURA) is a consortium of 39 US institutions and 7 international affiliates that operates world-class astronomical observatories. AURA's role is to establish, nurture, and promote public observatories and facilities that advance innovative astronomical research. In addition, AURA is deeply committed to public and educational outreach, and to diversity throughout the astronomical and scientific workforce.

CENTER FOR BIORENEWABLE CHEMICALS REU PROGRAM (CBiRC)

The National Science Foundation's (NSF) Engineering Research Center's Center for Biorenewable Chemicals (CBiRC) will host REU students who will work toward achieving CBiRC's core mission of transforming the US chemical industry by integrating biological and chemical catalysis systems to produce biorenewable chemicals. The REU students will work in CBiRC labs conducting fundamental research to address the underlying technical challenges in the development of new integrated catalytic systems for the conversion of bio-based feedstocks to industrial chemicals.

CENUSA BIOENERGY RESEARCH INTERNSHIP FOR UNDERGRADUATE STUDENTS

The summer 2017 CenUSA Bioenergy Research Internship Experience for Undergraduates will provide rich interdisciplinary training and engagement opportunities for undergraduate students in all areas of the bioenergy value chain to meet the workforce challenges of the emerging bioeconomy.

The research internship program will enroll a class of 12 students, with all students spending the first five days in the program at the Iowa State University host site. While a portion of the students will remain at Iowa State University, several of the students will then travel to one of CenUSA's partner institutions (depending on their research interests) to complete their summer program at a partner lab. All students will maintain contact with the program through distance technologies for weekly meetings, seminars, and final presentations.

For more information or to apply, visit: http://www.abe.iastate.edu/cenusa/

COMMUNITY COLLEGE INTERNSHIP (CCI)
U.S. DEPARTMENT OF ENERGY'S AMES LABATORY AT IOWA STATE UNIVERSITY

The Community College Internship (CCI) program seeks to encourage community college students to enter technical careers relevant to the DOE mission by providing technical training experiences at the DOE laboratories. Selected students participate as interns appointed at participating DOE laboratories, including the Ames Laboratory. They work on technologies or instrumenta- tion projects or major research facilities supporting DOE's mission, under the guidance of laboratory staff scientists or engineers. Applications for the CCI program are solicited annually for the summer term. Internship appointments are 10 weeks in duration.

CCI website: http://science.energy.gov/wdts/cci/ Contact: Steve Karsjen, Education Programs Director, karsjen@ameslab.gov

Student Opportunities Fair Exhibitors

IOWA BIOSCIENCES PROGRAM

The Biosciences Program is a multidisciplinary entry program for 11 PhD degree granting departments and programs at The University of Iowa. The program provides students the flexibility of investigating several disciplines prior to affiliating with a specific degree program by allowing students to perform three research rotations in the laboratories of any of the Biosciences Program faculty, regardless of their departmental or program affiliation.

IOWA STATE UNIVERSITY GRADUATE COLLEGE

Iowa State's vision is to be the best at advancing the land-grant ideals and putting science and technology to work. Our commitment in the Graduate College is to help you become a broadly educated, global citizen who is culturally informed, technologically adept, ready to lead, and prepared for your career. You will develop collaborative relationships with faculty who are national and international leaders in their fields of study.

Find your program of interest on the Graduate College website http://www.grad-college.iastate.edu/ and take a look at the faculty research interests as well as on-going work at our various federal facilities. Contact the professors directly about opportunities. www.grad-college.iastate.edu has detailed information about admissions requirements. The rate of admission varies for different programs, but approximately 50% of US applicants are accepted.
Approximately 90% of PhD students and 30% of masters students are offered assistantships with a monthly stipend averaging approximately $2,000. Most students holding assistantships also receive tuition support.

IOWA STATE UNIVERSITY MCNAIR PROGRAM

The Iowa State University McNair Program prepares qualified undergraduates for entry to graduate school and completion of a doctoral degree. The primary goal of McNair is to increase the attainment of PhD degrees by students from disadvantaged and underrepresented populations. McNair Scholars are afforded many opportunities during their two years of active participation. Activities and services range from working with a professor on a research project to knowing how to survive the critical first year of graduate school.

NAHANT MARSH

Nahant Marsh is a 256 acre treasure nestled in Southwest Davenport. It is part of the 513 acre wetland complex that is bordered by the Mississippi River, Interstate 280, and Highway 22. Nahant Marsh preserve is one of the largest urban wetlands on the Upper Mississippi River. Nahant Marsh was used for skeet and trap shooting from the 1960's to the 1990's. Because of the lead left behind, the marsh was declared an EPA Superfund site and was cleaned up in 1999. After that time, the site was declared a preserve and educational center. The city of Davenport, the Nahant Board, Eastern Iowa Community College District, and River Action are all parts of Nahant Marsh.

Research is an integral part of Nahant Marsh. We are able to expand our knowledge of the ecosystems found here, which allows us to better maintain this amazing natural area. Research projects also allow students to participate in exciting projects and gain hands-on experience in their field of study. We offer research opportunities in the fields of Wildlife Biology, Ecology, Animal Behavior, Botany, Hydrology, Chemistry, Genetics, Geology, Geography, Toxicology, and many more.

RESEARCH INNOVATION IN SCIENCE ENRICHMENT UNIVERSITY PROGRAM (RISEUP)

RISEUP is a new summer research and experiential learning program at Iowa State University available to minority community college students. Students participate in professional development activities that prepare them for transfer to baccalaureate degree programs in STEM while working alongside faculty in research.

SCIENCE UNDERGRADUATE LABORATORY INTERNSHIP (SULI) U.S. DEPARTMENT OF ENERGY'S AMES LABATORY AT IOWA STATE UNIVERSITY

The Science Undergraduate Laboratory Internship (SULI) program encourages undergraduate students to pursue science, technology, engineering, and mathematics (STEM) careers by providing research experiences at the Department of Energy (DOE) laboratories. Selected students participate as interns appointed at participating DOE laboratories, including the Ames Laboratory. They perform research, under the guidance of laboratory staff scientists or engineers, on projects supporting the DOE mission.

Applications for the SULI program are solicited annually for three separate internship terms. Internship appointments are 10 weeks in duration for the summer term (May through August) or 16 weeks in duration for the fall term (August through December) and spring term (January through May) terms.

SULI website: http://science.energy.gov/wdts/suli/ Contact: Steve Karsjen, Education Programs Director, karsjen@ameslab.gov

VISITING FACULTY PROGRAM (VFP)
U.S. DEPARTMENT OF ENERGY'S AMES LABORATORY AT IOWA STATE UNIVERSITY

The Visiting Faculty Program (VFP) seeks to increase the research competitiveness of faculty members and their students at institutions historically underrepresented in the research community in order to expand the workforce vital to the Department of Energy (DOE) mission areas. As part of the program, selected university/college faculty members collaborate with DOE laboratory research staff on a research project of mutual interest. Faculty member participants may invite up to two students (one of which may be a graduate student) to participate in the research project.
Applications for the VFP are solicited annually for appointments to the summer term (May through August), which is 10 weeks in duration. Each of the participating DOE laboratories, including the Ames Laboratory, offer different research opportunities and interested faculty members are encouraged to contact Ames Laboratory scientists in advance to discuss research projects of mutual interest. All VFP faculty applicants must submit at the time of application a research project proposal co-developed with the collaborating research staff located at the host DOE laboratory.

VFP website: http://science.energy.gov/wdts/vfp/ Contact: Steve Karsjen, Education Programs Director, karsjen@ameslab.gov

IOWA STATE UNIVERSITY TRANSFER ADMISSIONS OFFICE

The Office of Admissions at Iowa State University is dedicated to helping you answer any questions you have regarding admission requirements and campus life. Specifically, Transfer Admissions is here to help you understand how credits transfer to the University vs. apply to your program as well as introduce you to transfer planning resources so you can plan your transfer successfully. Transfer Admissions has close relationships with all 15 Iowa community colleges as well as institutions in the contiguous states.

THE PREDICTIVE PLANT PHENOMICS PROGRAM, AN NSF RESEARCH TRAINEESHIP OPPORTUNITY AT IOWA STATE UNIVERSITY

We are looking for curious students (engineers, plant scientists, and data scientists) who are capable of addressing key agronomic challenges of the 21st century!

The world population is growing and climate is changing. Agricultural systems are challenged to scale and adapt to meet the increasing demands for food, feed, fiber, and fuel produced on shrinking arable land and with diminishing water supplies.

Through the Predictive Plant Phenomics (P3) Program at Iowa State University, we bring together graduate students with diverse backgrounds, including plant sciences, statistics, and engineering, and provide them with data-enabled science and engineering training.

We welcome and encourage US citizens, permanent residents, and international students who are enrolled in one of our six participating ISU graduate degree programs to participate in the Predictive Plant Phenomics (P3) Program. Our NSF Research Traineeship does offer a scholarship opportunity ($34K stipend, tuition, fees, and benefits for the first year) for US citizens and permanent residents. International students are not eligible for this NSF Research Traineeship (NRT) stipend support and therefore are encouraged to explore other mechanisms of financial support offered at Iowa State.

For more information, visit www.predictivephenomicsinplants.iastate.edu

Student Opportunities Fair Exhibitors

BioMAP REU
The Department of Chemical and Biological Engineering at Iowa State University hosts the Biological Materials and Processes Experience for Undergraduates (BioMaP REU) summer research experience for undergraduate students. This opportunity is open to U.S. citizens and permanent residents. The program creates novel research experiences for undergrad students from around the country in the areas of biological materials and processes. Students are active members of interdisciplinary groups and interact with faculty, post-doctoral researchers, graduate students and industry. Students may also participate in cohort experiences such as short courses, joint seminars/meetings, workshops, tours of research facilities and field trips.

MOSAIC REU
The Department of Mechanical Engineering at Iowa State University hosts a summer research experience for undergraduate students. The program will create novel research experiences for undergraduate students in the areas of design and manufacturing of micro/nanoscale sensors, actuators, and smart materials, as well as advanced imaging and diagnostic systems. REU students will be active members of interdisciplinary groups and will interact with faculty, post-docs, graduate students, and industry. The students will participate in cohort experiences such as short courses, joint seminars/meetings, workshops, tours of research facilities, and field trips. At the end of the program, REU students will participate in a joint poster symposium with students from other undergraduate summer research programs from across campus. To complement the research experience and provide opportunities for students to get to know each other better, a number of social and recreational activities will be organized. These activities will range from the Central Iowa Festival of Arts in Ames to outdoor activities including hiking, biking, and sailing.

IOWA LAKESIDE LABORATORY
Lakeside Lab is owned by the state of Iowa and operated through the Board of Regents. Its mission is twofold: 1) to provide science classes and research opportunities for university students, and 2) to offer Outreach Programs and provide services through the state universities. Lakeside's 147-acre campus is located on scenic West Okoboji Lake, on Little Miller's Bay.

SACNAS
SACNAS is an inclusive organization dedicated to fostering the success of Chicano/Hispanic and Native American scientists, from college students to professionals, in attaining advanced degrees, careers, and positions of leadership in STEM.The full acronym stands for Society for Advancement of Chicanos/Hispanics and Native Americans in Science. SACNAS achieves mission impact through outcome-based programming and initiatives.

SOCIETY OF HISPANIC PROFESSIONAL ENGINEERS (SHPE)
SHPE changes lives by empowering the Hispanic community to realize its fullest potential and to impact the world through STEM awareness, access, support and development. SHPE's vision is a world where Hispanics are highly valued and influential as the leading innovators, scientists, mathematicians and engineers.

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NATIONAL SCIENCE FOUNDATION
Louis Stokes Alliance for Minority Participation

Grant No HRD-1102461, August 2011-2016
Grant No HRD-1619654, October 2016-2021
This material is based upon work supported by the National Science Foundation under Grants No HRD-1102461 and HRD-1619654
Any opinions, findings, and conclusions or recommendations expressed in this materials are those of the authors and do not necessarily reflect the view of the National Science Foundation.