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**4TH ANNUAL UTEP IDR SYMPOSIUM  
CREATING THE SPACE, CULTURE, AND ANCHORS FOR  
INTERDISCIPLINARY RESEARCH AND EDUCATION (IDRE)  
APRIL 25, 2016**

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**MIXED MEDIA POSTER PRESENTATION ABSTRACTS**

**Category A:**

**Newly emerging research/education projects or communities that seek to extend involvement**

**1. Providing Support and Facilitating Connections: the Interdisciplinary Research and Education (IDRE) Community of Practice**

Gaspare Genna, Associate Professor, Liberal Arts, Political Science

Andrea Tirres, Interdisciplinary Network Manager, Office of Research & Sponsored Projects

The Interdisciplinary Research and Education (IDRE) community was started in July 2014. It is made up of individuals from diverse academic disciplines and institutional positions involved in IDRE. We engage each other to improve the knowledge, ability, and capacity for enabling, leading, evaluating, and participating more effectively in IDRE. We aspire to be a vibrant, supportive community focused on expanding our knowledge base and skills for effectively leading IDRE, and providing access to best practices, methods and tools that facilitate successful IDRE. We have sponsored twelve events since our inception as a community, ranging from workshops to happy hours to presentations by members on their interdisciplinary projects. We welcome you to explore our community pages and attend our next event! You can find more information on this community as well as a list of members at

<http://expertise.utep.edu/communities/interdisciplinaryresearchandeducationidre>

**2. Introducing a new research community – Water Research Group**

Wen-Yee Lee, Associate Professor, Science, Chemistry

The world is facing the crises in water scarcity and pollution both of which are the two major factors for sustainable development and protection of human health and the environment. The experts and government leaders in the International Conference on Water and the Environment and the United Nations Conference on Environment and Development have clearly addressed the need to focus on fundamental approaches to the assessment, development and management of freshwater resources, technology development, public awareness campaigns, and capacity building programs. Underlying all these must be a greater recognition of the need for us to organize multidisciplinary efforts to address the crucial aspects of water research, such as monitoring water quantity and quality, developing advanced water treatment technologies, and public health risk assessment, and environmental assessment. UTEP is located in a perfect location to address water scarcity and trans-boundary environmental issues. The goal of this newly established Water Research Group is to integrate research expertise and resources on UTEP campus to establish the interdisciplinary research capacity on water related topics. The community aims to actively collaborate and share resources with researchers across the US and other nations to pursue research and funding opportunities for research and education on water quality issues on local, regional, and global scales.

**3. Impacts of Dust on Tropical Volcanic Soil Formation: Insights from Strontium and Uranium-Series Isotopes in Soils from Basse-Terre Island, French Guadeloupe**

Yvette Pereyra, MS Candidate, Science, Geology

Lin Ma, Assistant Professor, Science, Geological Sciences

Thomas Gill, Professor, Science, Geology

Deposition of dust at Earth's surface plays an important role in soil formation. This is especially important for old and thick soils that formed on tropical volcanic islands with large amount of rainfall. These soils are highly depleted in mineral nutrients due to intensive chemical weathering. Mineral nutrients added by dusts have been known to be important in sustaining soil fertility and productivity. We would like to further collaborate with colleagues from Health Sciences to discuss whether dusts carry particles that could be a health concern to people and also individuals in Biology to understand key chemical elements that are added by dust to support surface vegetation and biota. Our study analyzes major elemental concentrations and isotopic ratios (Sr and U-series isotope ratios) in highly depleted soils in the tropical volcanic island of Basse-Terre, French Guadeloupe. Sr and U-series isotopes are excellent tracers to determine atmospheric input sources and to identify key soil formation processes. Three soil profiles from the island show a significant depletion of U, Sr, and major elements in the deep profile (12-4 m deep) attributed to rapid chemical weathering. The shallow soil profiles (4 m deep to the surface) all show addition of elements such as Ca, Mg, U, and Sr due to atmospheric dust. Sr and U-series isotope compositions in the topsoil profiles further confirm that the sources of the dust are from the Saharan desert, through transatlantic transport from Africa into the Caribbean region. Our study finds that dusts and marine aerosols add nutrients to highly depleted surface soils of tropical oceanic islands.

#### **4. UTEP Group to Promote Neutron Scattering Research and Education**

José Leobardo Bañuelos, Assistant Professor, Science, Physics

Neutron scattering is a key technique to help advance the science of materials important in physics, chemistry, biology, earth science, and engineering. Neutrons are unique probes to discover the properties of matter over many energy, length and time scales, and are complementary to techniques that use electrons or photons as probes. While neutron facilities are located at national laboratories, they are a resource available to researchers worldwide through peer-reviewed experiment proposals. The initial goal is to bring together researchers from the graduate through faculty level who are conducting research in science and engineering and identify areas at UTEP in which neutron scattering may contribute significantly. The primary vision for this group is to provide a forum where faculty seeking new funding opportunities can work together to plan how neutron scattering would be incorporated into a research strategy within a competitive grant proposal. The group will be a liaison between faculty with new projects and staff scientists at U.S. Scientific User Facilities (SUFs) and help develop new proposals for access to SUFs. Through these efforts, UTEP members will gain education about using neutrons as a probe to investigate both fundamental molecular-scale phenomena and practical applications in a wide-array of materials. Additional activities could include seeking funding to support travel for students & faculty to use SUFs, host experts in the field to give seminars at UTEP, and offer small seed grants to help develop new projects. The group would actively encourage participation of students in national/international training schools. Success in these efforts will establish long-term collaborations between UTEP faculty and National Laboratory scientists. Students will develop an additional key skillset to be competitive for employment beyond the doctorate. UTEP will have a self-sustained hub of researchers that incorporate neutron science into their research and educate future generations of students and faculty.

#### **5. Tracing anthropogenic salinity inputs to the semi-arid Rio Grande River: a multi-isotope tracer (U, S, B and Sr) approach**

Sandra Garcia, Master's student, Science, Geological Sciences

Lin Ma, Assistant Professor, Science, Geological Sciences

Syprose Nyachoti, PhD candidate, Science, Geological Sciences

Irrigation with high saline Rio Grande water has led to severe reductions in crop productivity and salt accumulation in soils. Salinity contributions to the Rio Grande have not been adequately quantified, especially from agriculture, urban activities, and geological sources. Here, we study how and when salinity changes along a 200 km long stretch of the Rio Grande from Elephant Butte Reservoir, NM to El Paso, TX. We measure U, S, B, Sr isotopic signatures to fingerprint the salinity sources. Our study improves our understanding of human impacts on water quality in our region. Here, we would like to seek collaboration with our peers from

Environmental Science and Civil Engineering to discuss possible ideas to reduce anthropogenic salinity inputs to the Rio Grande. We are also interested in speaking with people in Health Sciences to discuss possible health concerns due to high levels of trace elements in Rio Grande water. Our study with major element chemistry, U, S and Sr isotope ratios suggests multiple salinity sources from geological, agricultural, and urban areas to in the Rio Grande water. For example, natural upwelling of groundwater is significant for the Rio Grande near Elephant Butte, as suggested by high TDS values and high ( $^{234}\text{U}/^{238}\text{U}$ ),  $^{87}\text{Sr}/^{86}\text{Sr}$ ,  $\delta^{34}\text{S}$  ratios. Agricultural activities (e.g. flood irrigation, groundwater pumping, and fertilizer use) are extensive in the Mesilla Valley. Rio Grande waters from this region have characteristic lower ( $^{234}\text{U}/^{238}\text{U}$ ),  $^{87}\text{Sr}/^{86}\text{Sr}$ , and  $\delta^{34}\text{S}$  ratios, with possible agricultural sources from use of fertilizers and gypsum. Agricultural practices during flood irrigation also intensify evaporation of Rio Grande surface water and considerably increase water salinity. Shallow groundwater signatures were also identified possibly due to the artificial pumping of local groundwater for irrigation. Impacts of urban activities to river chemistry were evident for locations downstream to Las Cruces and El Paso wastewater treatment plants.

## **6. Ultrasensitive ELISA for detection of infectious diseases on surface modified polymer microfluidic microplates**

Sanjay Sharma Timilsina, PhD candidate, Science, Chemistry

Maowei Dou, PhD candidate, Science, Chemistry

Jianjun Sun, Associate Professor, Science, Border Biomedical Research Center

XiuJun Li, Assistant Professor, Science, Chemistry, Biomedical Engineering and Border Biomedical Research Center

Infectious diseases caused by bacteria, fungi and viruses have been the leading cause of death and mortality throughout the world. Enzyme linked immunosorbent assay (ELISA), is one of the most widely used laboratory assay methods for medical diagnosis of infectious diseases and cancers, plant pathology, quality control, and research applications. Unspecific absorption of protein in this assay often leads to high background and low sensitivity. Specific binding of proteins can enhance the binding efficiency and improve the sensitivity of the assay. Herein, we have developed a simple, miniaturized polymer ELISA microplate, where the protein is specifically bound to the modified polymer surface. Unlike ELISA in traditional microplates, which is often limited by long incubation and blocking time, rapid and ultrasensitive detection of disease biomarkers can be completed within 90 min in this microplate with much less reagent consumption. Assays do not require expensive and sophisticated equipment and results can even be observed by the naked eye. Quantitative analysis can be achieved by calculating the brightness of images scanned by a desktop scanner. Although no specialized ELISA equipment was used, the limits of detection of 190 pg/mL for Immunoglobulin G (IgG) and 360 pg/mL for hepatitis B surface antigen (HBsAg) have been achieved using this polymer microplate. The assay result is around 10 fold more sensitive as compared to commercial ELISA kits. We visualize that this modified polymer microplate can be used in point-of-care (POC) settings to perform biological assays and other complex medical assays, which are currently performed in traditional microplates. In future, the assay of clinical samples will be done in the polymer microplate for its validation.

## **7. UTEP's Cyber Security Community**

Damien Van Puyvelde, Assistant Professor, Liberal Arts, National Security Studies Institute

This presentation examines the past, present, and future of UTEP's Cyber Security Community of Practice to reflect upon some of the main challenges and opportunities faced by inter disciplinary projects. Our community connects UTEP faculty and professional staff who have expertise and knowledge in cyber security or in adjacent competencies. It enables faculty, staff and students to explore new ideas, solve challenging problems, identify new opportunities, and disseminate shared knowledge and resources. We aspire to build the assets and capabilities in cybersecurity at UTEP that can lead to significant educational and research initiatives.

## **8. Towards a Model of Conversational Agents in Performance and Immersive Non-Fictional Contexts**

Adriana Dominguez, Director of Audience Development and Senior Lecturer, Liberal Arts, Theatre and Dance

Rebecca Rivas, Assistant Professor of Voice, Movement and Acting, Liberal Arts, Theatre and Dance  
Sabiha Khan, Assistant Professor of Digital Media Production, Liberal Arts, Communication  
David Novick, Mike Loya Distinguished Chair in Engineering and Professor of Computer Science, Engineering, Computer Science  
Ivan Gris, Postdoctoral Fellow, Engineering, Advanced Agent Engagement Team, Computer Science  
Adriana Camacho, PhD Candidate, Engineering, Advanced Agent Engagement Team, Computer Science  
Alex Rayon, Master's Candidate, Engineering, Advanced Agent Engagement Team, Computer Science

Our interdisciplinary team comprises faculty and students from Theatre and Dance, Communication, and Computer Science. We propose a model for using embodied conversational agents (ECAs) in a number of immersive environments that range from the theatrical stage to non-fictional content-driven contexts such as museums and documentary media. Extending existing immersive technologies such as virtual and augmented reality, ECAs engage the user through both gesture and speech, thereby bringing the user into the immersive space through a relationship of trust. We are exploring multiple applications, including "RehearsalWorld" and a Virtual Docent. "RehearsalWorld" will provide an intelligent, immersive system for actors to learn their lines. By enabling actors to ask for their lines as well as detecting and correcting wrong lines, this program underscores the distributed nature of performative agency in the theatrical setting. Existing technologies feature only audio and require the user to record all lines beforehand. "RehearsalWorld" will provide an immersive system with full-body ECAs that will highlight not only the textual but the gestural basis of performance. Moreover the system will provide lines that have been recorded by experienced actors, which will enable actors to respond to subtleties in tone and inflection. The Virtual Docent will be an ECA at the Smithsonian Latino Center. This application presents challenges of producing media assets for this interactive and immersive platform that straddles both physical and digital space. Because the virtual docent will guide in a physical space, it will need a gestural repertoire to orient the museum visitor. And because the virtual docent is a projected ECA, it can also inhabit the personas of various historical characters that have been constructed digitally through archival materials such as interview transcripts, letters, and diaries. Unlike existing immersive documentary media platforms, the virtual docent engages the visitor through both speech and gestural recognition.

#### **9. High fidelity computational model for simulating large scale multiphase flow problems**

V M Krushnarao Kotteda, Postdoc fellow, Engineering, Mechanical  
Ashesh K Chattopadhyay, Graduate, Science, Computational Science  
Vinod Kumar, Associate Professor, Engineering, Mechanical  
William Spotz (Bill), Technical Staff, Multiphysics Applications, Sandia National Labs, Albuquerque

Interdisciplinary links and integrates frameworks from Applied mathematics, computational science, computer programming, fluid dynamics, molecular dynamics, physics and many other disciplines and employs methods and skills from them. The creation of interdisciplinary programs, research groups and centers are rapidly becoming integral features of academia to solve more complex and challenging problems facing by the society. The educational backgrounds needed to meet those challenges cannot be provided by a single discipline. In the present work, we develop, validate and implement advanced linear solvers to replace the existing linear solvers that are used by the National Energy Technology Laboratory's (NETL) open source software package Multiphase Flow with Interphase eXchanges (MFiX). This is achieved by integrating Trilinos, a publicly available open-source linear equation solver library developed by Sandia National Laboratory, with MFiX. The work will demonstrate scalability of the Trilinos-MFiX interface on various high-performance computing facilities. It requires the knowledge of linear equation solvers, programming in Fortran, C/C++, MPICH, OpenMP, multiphase flows and computer hardware. The objective of this work can be achieved by (i) creating a framework to integrate the existing MFiX linear solver which is written in Fortran language, with Trilinos linear solver packages which are written in C++, (ii) evaluate the performance of the state-of-the-art preconditions and linear solver libraries in Trilinos and perform a scalability analysis for the selected libraries on large parallel computing systems to improve computing performance of the Trilinos-MFiX interface, and (iii) compare the performance of the Trilinos-MFiX package on massively parallel high performance computers with the existing MFiX-linear solver packages for gas-solid fluidized bed problems. The framework to integrate MFiX with Trilinos will reduce the computational cost as well as convergence instabilities when solving gas-solid flow in large scale flow problems.

The framework allows MFIX to use various preconditioners and solvers in Trilinos to solve complex flow problems on massively parallel computers.

### **10. Digitizing Syrian Musical Traditions and Performance in an Age of Global Precarity**

Andrea Shaheen, Assistant Professor of Ethnomusicology and Oboe Studies, Liberal Arts, Music  
Sabiha Khan, Assistant Professor of Digital Media Production, Liberal Arts, Communication  
Christopher Reyman, Assistant Professor of Commercial Piano, Liberal Arts, Music

This project responds to the effects of the Syrian conflict on the performance activities of Syrian musicians and dancers both in the Middle East and in diaspora. We propose a two-fold digital strategy for addressing the negotiations of cultural, political, and economic capital that Syrian performance artists have had to undergo during this precarious time. With Syrian musicians in diaspora becoming more active in performance, perceptions of authority on musical tradition have shifted along cultural, religious, and generational divides. We propose that a digital archive and performance space for the music of this region can help underscore shared musical concepts across divides within the larger Syrian artistic community as well as other musical traditions such as Western classical music. We propose this as a model for sustaining other traditional musical knowledge that is at risk because of precarious global circumstances such as political instability or climate change.

Proposed outcomes: Online, immersive, digital archive of both canonical Syrian musical knowledge and contested areas of performance in the form of videos, web buildouts, open source musical scores; Experimentation with music composition, rehearsals/performances, and contextual masterclasses using low-latency audio streaming/recording technology.

### **11. Land-Air Interactions and their Impacts on Human Health and Climate**

James Kubicki, Professor, Science, Geology  
Tom Gill, Professor, Science, Geology  
Nick Pingitore, Professor, Science, Geology  
Jorge Gardea-Torresdey, Professor, Science, Chemistry  
Rosa Fitzgerald, Professor, Science, Physics  
Hector Olvera, Associate Professor, School of Nursing  
Vinod Kumar, Professor, Engineering, Mechanical Engineering

Atmospheric aerosols have dramatic effects on human health (especially in arid regions) and are one of the largest sources of uncertainty in current climate models (Figure). Respiration of airborne particles causes lung disease, radiative effects influence Earth's surface temperature, and particles act as cloud condensation nuclei that control precipitation. The behavior of these atmospheric aerosols are the net effects of physical and chemical processes that control their transport and transformation. However, it is rare to see scientists who study physical processes such as atmospheric transport and chemical processes such as surface reactions working together in a comprehensive manner. The addition of geoscientists who study the natural materials that are the source of these aerosols provides a foundation in natural process that combine the physics and chemistry. This type of team is necessary in order to predict potential impacts of aerosols on health and climate.

The current team (Phase I group) would be a powerful group to address the atmospheric aerosol issue (Figure), but the formation of this community could begin collaborations on a wide variety of scientific questions from both a physical and chemical perspective. With this nucleus, we would broaden participation by including geographers (Collins), biologists (Darrouzet-Nardi) and medical professionals. The combination of field, laboratory and computational simulations will allow us to maximize the data and knowledge from each discipline in order to create a holistic model that can be applied to practical problems in exposure prediction and climate impacts.

### **12. Mindfulness in Education**

Kim Díaz, Visiting Professor, Liberal Arts, Philosophy  
Kien Lim, Associate Professor, Science, Mathematics

Julius Simon, Professor, Liberal Arts, Philosophy  
Rocio Acevedo, PhD Candidate, Education, TLC  
Charles Boehmer, Associate Professor, Liberal Arts, Political Science  
Antonio Martinez, PhD Candidate, Liberal Arts, Psychology  
Art Duval, Professor, Mathematical Sciences, Mathematical Sciences  
Danielle Morales, Post-doctoral, Science, BUILDing SCHOLARS  
João Ferreira-Pinto, Associate Professor, Health Science, Dean's Office  
Manuela A. Gomez, EPCC Faculty, Social Science, Philosophy  
Patricia Carrete, UTEP Library Assistant

The Mindfulness Education Inter-disciplinary group is a community for research and practice that seeks to learn how to incorporate mindfulness in our various classrooms. Mindfulness is defined as “a moment-to-moment awareness of one’s experience without judgment” (Davis & Hayes, 2011). We believe that the benefits of mindfulness practice can be helpful for all disciplines, beginning with our students, to our various colleges, student affairs, the members of our administration, our student athletes, staff members, and faculty. Various institutions such as Georgetown University, Rice University, and Brown University, in the U.S., and the University of Oxford, as well as the University of Cambridge in the U.K. have established various Mindfulness programs such as Master's degrees, centers or mindfulness courses. Established research shows that mindfulness improves cognitive functions such as working memory (Jah, et al. 2010), and concentration (Young 1997). Mindfulness also improves emotional intelligence, such as decreasing emotional reactivity (Ortner et al. 2007), and it improves general well-being by reducing psychological distress and anxiety (Shapiro, 1998). Thus it is our hope to cultivate mindfulness in every kind of classroom, so as to have effective techniques and active mindfulness strategies. Furthermore, we seek to foster inter-campus collaboration (UTEP, EPCC, and UACJ). Besides these academic collaborations, our Mindfulness Education members have established partnerships with the community at large, including the public school systems as well as the judicial and correctional systems in El Paso. This symposium allows us to inform the IDRE community of the existence of a mindfulness community at UTEP. If need arises, we will incorporate mindfulness workshops for individuals who wish to learn and/or try out mindfulness practice. We believe this mindfulness community offers a platform for researchers across disciplines to collaborate on research projects and seek external funding.

### **13. Applying Positive Deviance Inquiry to Issues of Assistive Technology Access in the Paso del Norte Region**

Kristin Kosyluk, Assistant Professor, Health Sciences, Rehabilitation Counseling  
Meagan Vaughan Kendall, Assistant Professor, Engineering, Engineering Education and Leadership  
Luis Enrique Chew, Executive Director, VOLAR Center for Independent Living of and for People with Disabilities  
Joey Acosta, Building Community Capacity Program Coordinator, VOLAR Center for Independent Living of and for People with Disabilities  
Antonia Ostos, Master's student, Health Sciences, Rehabilitation Counseling  
Stephanie Chapman, Master's student, Health Sciences, Rehabilitation Counseling

Traditionally, we approach complex issues by asking, “What risk factors are associated with poor outcomes?” Once these factors are identified, we use this data to design solutions to remedy the problem. Positive Deviance (PD) is an approach to solving complex social issues, which “flips” this traditional research question on its head. Instead of asking “What factors predict poor outcomes?” PD asks, “Are there individuals in the community with x, y, and z risk factors, who are successfully navigating these issues without additional resources?” PD assumes that within every community lie members whose uncommon behaviors and strategies enable them to find better solutions to problems than their peers although everyone has access to the same resources and faces the same challenges (Pascale, Sternin, & Sternin, 2010). These outliers are deviants because their uncommon behaviors are not the norm; they are positive deviants because they have found ways to effectively address the problem, while most others have not (Singhal, 2013). PD aims to uncover existing wisdom and ultimately amplify these solutions to produce programs that can be offered to the larger community to produce positive change. Our team, comprised of faculty and students from UTEP's Department of Rehabilitation Sciences and College of Engineering, and community members including staff from VOLAR Center for Independent Living—an agency devoted to promoting independent living for

individuals with disabilities in the Paso del Norte region—aims to use PD to solve issues of access to Assistive Technology (AT) for individuals with disabilities in the region. Instead of asking, “What factors are associated with poor access to AT?” we’re asking, “Are their individuals with AT needs in our region who are successfully navigating their environments without access to AT?” Engineering students will design products in partnership with people with disabilities based on the PD strategies we uncover.

#### **14. Smart Cities at UTEP and beyond: research, community of practice, and student engagement**

Kelvin Cheu, Professor, Engineering, Civil Engineering

Ann Gates, Professor, Engineering, Computer Science

Natalia Villanueva Rosales, Assistant Professor, Engineering, Computer Science

Sergio Cabrera, Associate Professor, Engineering, Electrical and Computer Engineering

Cesar Carrasco, Professor, Engineering, Civil Engineering

Carlos Ferregut, Professor, Engineering, Civil Engineering

Oscar Mondragon, Clinical Associate Professor, Engineering, Industrial, Manufacturing, and Systems Engineering

Soheil Nazarian, Professor, Engineering, Civil Engineering

Making cities “smarter” or transforming them into smart cities is the process of improving economic competitiveness and quality of life by implementing cyberinfrastructure technologies throughout a city, linking the city’s infrastructure services with each other, the residents, leaders and all other stakeholders. In an effort to launch a “smart city” research program at UTEP, UTEP researchers in civil engineering, electrical engineering, industrial, manufacturing and systems engineering, and computer science have formed a research community with each member bringing a unique expertise in this area. The team is a collaboration with Dr. Victor Larios, Director of Smart Cities Innovation Center at Universidad de Guadalajara (UdeG), Mexico, and Dr. Miroslav Svitek, Dean of Faculty of Transportation Sciences at Czech Technical University (CTU), Czech Republic. The efforts aim to identify technological issues and formulate a research agenda for an international smart city research program. The group has secured a grant from the Partners for the Americas Foundation to launch the U.S.-Mexico Bi-Directional Study Abroad Program on Smart Cities. Although this is a study abroad program, students from both countries will form bi-national, multidisciplinary teams to work on research projects related to smart building, smart health care, and smart mobility, jointly supervised by faculty members from the three universities, with partial sponsorship from the information technology industry.

#### **15. Towards the Use of Scientific Research Networks to Analyze an Institution's State of Research**

Yanet Garay, Master's student, Department of Computer Science, Cyber-ShARE Center of Excellence

Monika Akbar, Research Assistant Professor, Cyber-ShARE Center of Excellence

Ann Q. Gates, Professor, Department of Computer Science, Cyber-ShARE Center of Excellence

Identifying research areas of a group of researchers is a difficult task because of the various levels of abstraction in which information may be presented; however, such a task is essential for detecting potential research collaborations within an institution. The presentation describes an approach to create a Scientific Research Network by analyzing relations among topics identified from researchers' scholarly data and utilizing domain ontologies. The derived network can be used to connect researchers, reveal the synergy between different topics associated with researchers within an institution, and identify less explored research areas that can be targeted for further study.

#### **Category B:**

**Individuals, teams, or communities of practice that seek to disseminate efforts**

#### **16. A Culture of Loving Kindness at UTEP**

Kien Lim, Assoc. Professor, Science, Mathematics

Vladik Kreinovich, Professor, Engineering, Computer Science

Antonio Martinez, PhD Candidate, Liberal Arts, Psychology

Kim Díaz, Visiting Professor, Liberal Arts, Philosophy

Rocio Alvarenga, Clinical Instructor, Health Sciences, Occupational Therapy

The UTEP Loving Kindness Faculty and Staff Group is an informal group with like-minded individuals who aspire to practice kindness. Our mission is to cultivate a culture of loving kindness that enhances student success and everyone's wellbeing at UTEP. The idea for this group was conceived in the 2013/14 Leadership Development Institute (LDI). Several LDI faculty organized a roundtable session at the 2014 Sun Conference and the attendees were interested to meet on a regular basis. Since then we have met regularly about once a month during term time. We have a total of 24 events (e.g., meetings, roundtable sessions) with an average attendance of 6.33 persons. Currently, we have 71 people in our mailing list, of which 19 have attended two or more of our events. We have conducted a roundtable session in each of the last three Sun Conferences, gave four podium presentations related to loving kindness in 2015 Sun Conference, presented at 2015 UTEP LIVE to share our vision with students, helped a group of students formed Miners for Kindness (a student organization), and participated in their Kindness at UTEP Collaborative Workshop. We are in the process of transitioning from an informal group into a Community of Practice. We hope to reach out to more faculty and staff who believe in kindness and wish to foster such a culture at UTEP, or who are interested to learn more about kindness, well-being, and eudaimonic happiness (as opposed to hedonic happiness). Through this community, members can inspire one another to enhance their kindness towards self and others. With sufficient interest, we can organize talks and workshops on topics related to loving kindness. This community is also an avenue for researchers to collaborate and identify research opportunities and/or apply for funding to support institutional transformation towards a culture of kindness. <https://youtu.be/yVbmUyc6NBo>

### **17. Providing community based research inputs to an emerging community of practice: Borders, migration, and human well-being**

Josiah Heyman, Professor and Director, Liberal Arts, Anthropology and Sociology and Center for Inter-American and Border Studies

Marlene Flores, MA student, Liberal Arts, Latin American and Border Studies

Jeremy Slack, Assistant Professor, Liberal Arts, Latin American and Border Studies

This community of practice is made up of UTEP faculty, community advocates, non-governmental organizations, and members of the community in order to identify areas of research that have the most need, impact, and visibility on border and immigration issues from human security/human rights/human well-being perspectives. There are two areas of focus: (1) Migration, authorized, unauthorized, and asylum; and (2) Ports of entry, mobility (trade and travel), and border community well-being. The tasks are to identify major emerging issues, to cluster people around them, and to start working groups on research proposals and writing projects. A snowball sample survey (using Qualtrics) was distributed widely to immigration advocacy email lists. A good response of 50 responses was returned. These included four open-ended questions designed to obtain advocacy community concerns and interests in potential research. Responses have been coded into major themes, as well as retaining the full set of data. This community-based input has been distributed to participants in an intensive research planning workshop. It will be one of the main bases for identifying research tasks and working groups around those tasks. These tasks will be planned in the workshop by interdisciplinary working groups of UTEP faculty and limited numbers of distinguished academic invitees. This method is useful to research groups exploring how to do effective community based research.

#### **Category C:**

#### **Active or completed interdisciplinary research/education projects that seek to disseminate results**

### **18. Implementation of a Connectomics Course-Based Undergraduate Research Experience in Introductory Biology**

Christina D'Arcy, Postdoctoral Instructor, Science, Biological Sciences

Arshad Khan, Assistant Professor, Science, Biological Sciences

Jeffrey Olimpo, Assistant Professor, Science, Biological Sciences

Within the last decade, course-based undergraduate research experiences (CUREs) have emerged as a vehicle to enhance student appreciation for and proficiency in investigative approaches in the STEM domains. In response to a need for diversified CUREs in the biological sciences, we developed and evaluated a Connectomics research experience, in which students engaged in fundamental neuroanatomical procedures to characterize unknown aspects of the rat hypothalamus. Post-course survey data indicate that students reported gains in experimental design skills, self-efficacy, science identity, and interest in pursuing graduate studies in (neuro)science following participation in the course.

### **19. A CD-like SpinChip for Simultaneous Detection of Multiple Pathogens**

Maowei Dou, PhD candidate, Science, Chemistry

Sharma T. Sanjay, PhD candidate, Science, Chemistry

Delfina C. Dominguez, Science, Health Sciences

XiuJun (James) Li, PhD, Science & Engineering, Chemistry/Biomedical Engineering/Border Biomedical Research Center

Infectious diseases frequently cause serious global health concern and economic loss. Meningitis is one of such infectious diseases that can become fatal in 24 hours after symptoms are noticed and often happens in high-poverty locations. Identification of the exact bacteria causing meningitis is significant because treatment and antibiotics differ for each type. Currently infectious disease diagnostic methods rely on well-equipped laboratories and well-trained personnel. They are either time-consuming, or requiring expensive and bulky equipment. Herein, we developed a low-cost CD-like SpinChip for rapid, highly sensitive and specific detection of the two main meningitis causing bacteria simultaneously, *N. meningitidis* and *S. pneumoniae*. The fabrication of the SpinChip is simple and rapid with a few minutes, and costs only a few cents. The SpinChip contains a reaction well for an isothermal DNA amplification of the bacteria, and multiple detection wells with different biosensors serving as fluorescence reporters for detections of the target bacteria. After the DNA amplification process, the specific bacteria can be easily identified based on the fluorescence signal of the corresponding detection wells. A paper disk that was placed inside each detection well facilitated the integration of the sensors without complicated and time-consuming surface modifications, and enabled the stable performance of the ready-to-use SpinChip for a long time (> 73 days). Within one hour, the limits of detection for *N. meningitidis* and *S. pneumoniae* were found as low as 6 copies and 12 copies per assay respectively. The direct detection of the two pathogenic microorganisms was successfully achieved with high specificity. No time-consuming sample preparation process or special instruments such as centrifuges was needed. This hybrid SpinChip has great potential in simultaneous multiplexed detection of a wide variety of other pathogens, especially in low-resource settings such developing countries.

### **20. Strategies to prepare entering freshmen for participation and success in STEM research: the BUILDing Scholars boot camp**

Allyson Hughes, PhD student, Liberal Arts, Health Psychology

Carlos Serna, PhD student, Engineering, Metallurgical, Materials, and Biomedical engineering

A major challenge for many students seeking a post-secondary degree is the lack of preparation for the rigor, hours, and skills necessary for college courses. To increase student success at the beginning stages of a student's academic career, many institutions are implementing summer mentoring camps to help bridge the gap from senior year in high school to freshman year in college. These summer mentoring camps provide an exposure to information that the students will see in the fall. A 3 week summer 'boot camp' was developed focusing on the required skills demanded from Calculus, Statistics and Reading Comprehension. To establish a foundation for future success, the camp aimed to transition the students into foundational research and research driven courses. In addition, this camp was complemented with supplemental programs including stress management, nutrition and wellness, computer literacy, and financial literacy. Students spent 8 hours per day in a 'scale-up' space fitted with a multitude of display monitors, projector screens, and whiteboards accessible to both students and instructors. The 'scale-up space' is meant to enhance student learning through group activity and enrich the quality of contact with the instructor. To quantify the effect of this active learning model, students were given a pre and post-test for each subject (Calculus, Statistics and Reading

Comprehension). Students also completed self-assessment surveys. Preliminary results showed statistically significant improvements in average grades for Calculus, student math, communication, learning, and critical thinking skills ( $p < 0.05$ ). Evaluations of the boot camp yielded positive results and reflected increased student self-confidence. Performance in research foundation courses is currently ongoing to assess the utility of the boot camp, but the boot camp appears to prepare students for both the rigors of college and for careers as research scientists.

### **21. When worlds collide: Combining diverse disciplines to better understand the vertebrate brain**

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Our rudimentary understanding of the diversity in structure and function of the brain has inhibited profoundly our ability to infer the neural evolutionary basis of complex behavior. The current research paradigm of using only “model organisms” (e.g., rats and mice) for basic science research has contributed to creating this fundamental challenge. Accordingly, we established an international, interdisciplinary collaboration between evolutionary biologists and neuroscientists to extend the numbers of species actively being studied in neuroscience. The international members of our team provide access to vertebrates that have never before been subject to neuroanatomical investigation. Here, we report field-testing traditional lab-based methods for brain preservation while collecting lizards in a biodiversity “hotspot” in Central Africa where such animals are endangered and threatened. Lizards caught and collected in their native fragile ecosystem were euthanized and their brains preserved on-site using portable “low-tech” supplies. These brains were brought back to UTEP and compared against the brains of lizards preserved under controlled lab conditions where resources are plentiful for such procedures. We found that tissue preservation conducted in lab or field conditions produced comparable quality brain tissue preservation. These results are important because they provide researchers with ways to preserve brain samples from poorly known species in remote parts of the world. Thus, scientists can extend their investigations of the brain beyond those of only commonly studied lab-housed species. This international project includes members from two leading research institutions in Africa, Congolese Research Center for Natural Sciences (Democratic Republic of the Congo) and Makerere University (Uganda); and two U.S. universities (UTEP and Oklahoma State University). We have established collaborations with several UTEP facilities, including the Statistical Consulting Laboratory and Genomic Analysis Core Facility of the Border Biomedical Research Center, UTEP Biodiversity Collections, and UTEP Systems Neuroscience Laboratory.