



THE UNIVERSITY OF ARIZONA  
**Study Arizona**  
Short-Term Programs

**STUDY ARIZONA** Short-Term Programs  
*Offering Strong Research, Professional and Cultural Experiences*

REVIEW & ABSTRACTS

2018



THE UNIVERSITY  
OF ARIZONA





THE UNIVERSITY OF ARIZONA  
Global





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Nadia Alvarez Mexia

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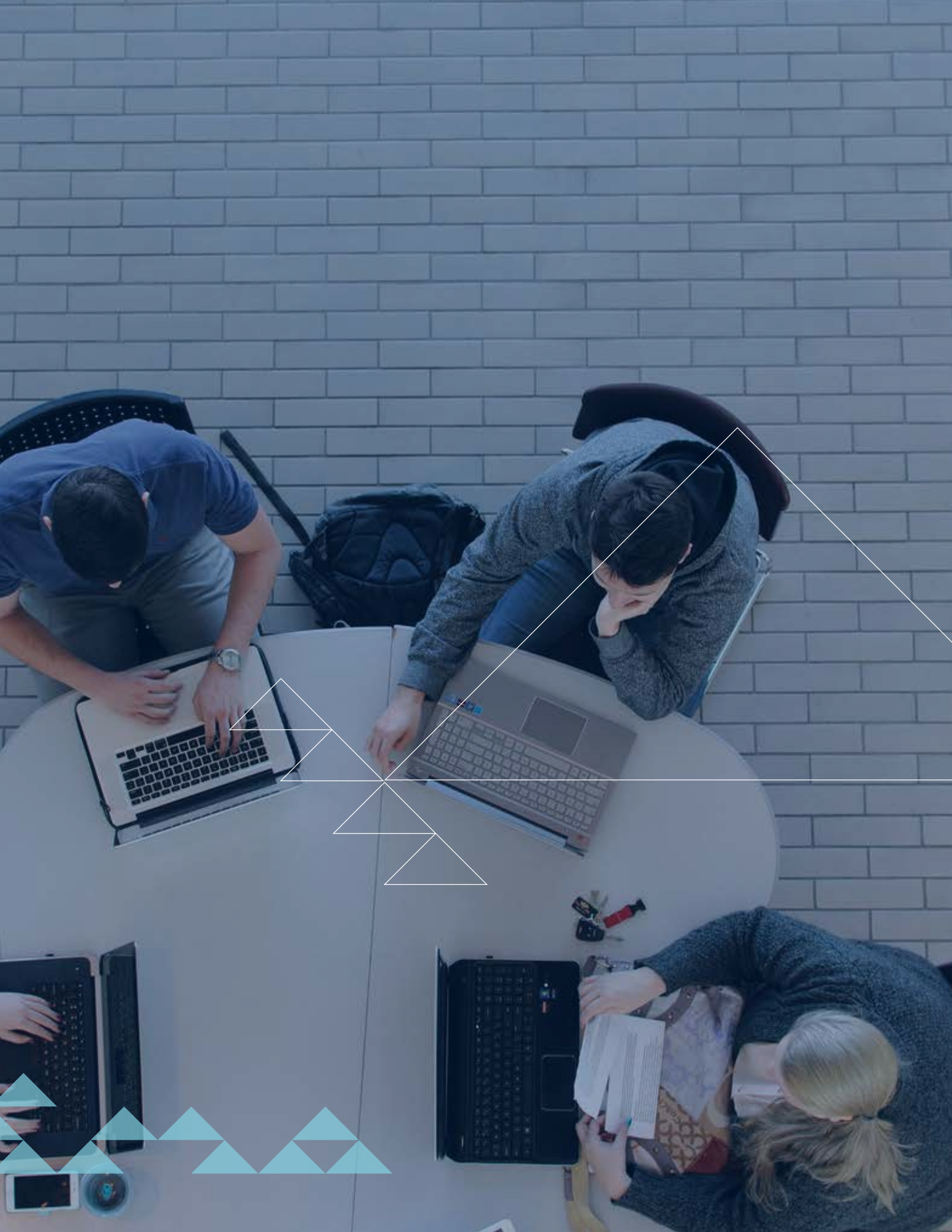
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## EXPERIENCE

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## SPECIAL THANKS





## WELCOME

On behalf of the **Study Arizona: Short-Term Programs** team, I want to personally congratulate you on successfully completing a summer experience at the University of Arizona.

Watching you grow both professionally and personally was a remarkable experience, and I hope you are proud of the accomplishments you attained in such a short period of time.

These intensive programs are designed for talented students and professionals from renowned institutions who want to explore the research or business worlds. The UA is pleased to open our campus to the international community, and I hope you found your experience meaningful and positive.

I also hope your program helped you define your professional goals, while also allowing you to forge new connections and friendships that will last a lifetime. Remember, that as a gifted researcher, innovator, or entrepreneur, you can become an agent of change to benefit your home country and beyond.

Regardless of the path you choose moving forward – whether you study business, the arts, or the sciences; whether you become a business executive, a government leader, or a celebrated researcher – we hope you are true to yourself and a true student of the world.

I look forward to seeing wonderful things from you in the future.

Sincerely,

A handwritten signature in black ink, appearing to read 'Nadia'.

~ **Nadia Alvarez Mexia, Ph.D.**

*Director*

*Study Arizona: Short-Term Programs*



*Participating Institutions:*

**Mexico**

Instituto Tecnológico de Sonora (ITSON)

Instituto Tecnológico Superior de Cananea (ITSC)

Universidad de Sonora (UNISON)

Universidad Autónoma de Ciudad Juárez (UACJ)

**Colombia**

Corporación Universitaria Minuto de Dios (UNIMINUTO, Campus Bogotá)

**United States**

University of North Carolina at Chapel Hill (UNC)

**Saudi Arabia**

King Abdullah University of Science and Technology (KAUST)

Institute of International Education (IIE)





# Study Arizona

## Short-Term Programs

### A Learning Research Experience - Graduate and Undergraduate

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This award-winning program offers a strong research, professional, and cultural experience for undergraduate and graduate students in the STEM fields and social sciences, with an emphasis on objective experimentation.

Students spend 10 weeks in Tucson participating in faculty-mentored research projects as active members of their mentors' research groups.

They also participate in intensive workshops focused on scientific writing, oral communication, and intercultural competence.

At the culmination of the program, students use their newly-acquired skills to deliver an abstract, poster, and oral presentation of their research projects.

Undergraduates also enjoy a Graduate School Symposium in which they acquire formal and informal knowledge of graduate school in the United States – from obtaining a student visa, to choosing a right mentor, to obtaining scholarships.

During their time in Tucson, students live on campus experiencing the life of a University of Arizona student. They have full access to sports facilities, library resources, city attractions, as well as academic, cultural, and sporting events.

Former participants have accomplished great research outcomes such as peer reviewed articles, conference poster presentations, experimental data for dissertation work, and early graduate program acceptance.



# A Learning Research Experience: ABSTRACTS







## David Armando Encinas Basurto

**Universidad de Sonora, México**

Mentor: Dr. Heidi Mansour, College of Pharmacy & Skaggs Pharmaceutical Sciences Center

Other authors: MF Acosta, College of Pharmacy Skaggs Pharmaceutical Sciences Center

Major: Nanotechnology, PhD Program

Title: *Co-Spray Drying of Simvastatin and L-Carnitine as a New Formulation for Treating Pulmonary Hypertension*

Pulmonary drug delivery is already becoming one of the most important routes for delivery of drugs to treat respiratory diseases such as pulmonary hypertension. Aerosols are an effective method to deliver therapeutic agents to the respiratory tract. Among aerosol generation systems, dry powder inhalers (DPI) have been an attractive area of research for both local and systemic delivery of drugs. The aim of this work was to develop co-spray dry powder (Co-SD) of Simvastatin (Sim) and L-Carnitine HCl (L-Car) employing organic solution closed mode using a Buchi Mini Spray-dryer. Physicochemical properties of the Co-SD particles were characterized using different techniques. All powders were inhalable in size (ca. 5  $\mu\text{m}$ ) determined by scanning electron microscopy (SEM). Crystallinity of the powders was determined by X-ray powder diffraction (XRPD) and was confirmed by the visualization of birefringence using hot-stage microscopy (HSM) under cross polarizing lens. The fine fraction of the powders was measured by Next Generation Impactor™ (NGI™), using NeoHaler and Handihaler devices for the deposition tests. Residual water in the Co-SD particles was around 4-10 % determined by Karl Fisher coulometric titration (KF). Phase behavior was quantified by differential scanning calorimetry (DSC). The presence of both SIM and L-Car in the powders was testified by attenuated total reflectance- FTIR. Co-SD resulted as non-toxic (up to 50  $\mu\text{g/mL}$ ) to human alveolar and bronchial cell-lines. The results provided valuable information for the optimal use and safety of Co-SD systems for targeted pulmonary drug delivery for the treatment of pulmonary hypertension.



## Gabriela Zubiate Cabanillas

**Universidad de Sonora, México**

Mentor: Dr. Stephen Black, Department of Medicine

Other authors: Dr. Xutong Sun, Dr. Qing Lu, Department of Medicine

Major: Health Sciences, MS program

Title: *The Study of Mitochondrial Dynamics Proteins in Pulmonary Arterial Hypertension (PAH) of Endothelial Cells*

Pulmonary arterial hypertension (PAH) is characterized with vasculature obstruction by vascular remodeling. It is a cancer-like phenomena: increase in cell proliferation and resistance to apoptosis. PAH has been suggested to present the Warburg effect, which is a mitochondrial-metabolic state of uncoupled glycolysis. It is a chronic shift in energy production from mitochondrial oxidative phosphorylation to glycolysis. Recent evidence showed that Warburg effect is correlated with an increase of mitochondrial fission. Mitochondria is a dynamic network, and the balance of fission and fusion dictates their morphology. Although mitochondrial fission is required for the formation of new mitochondria, it is also involved in their mobility, mitophagy, cell mitosis and apoptosis. Studies indicate that reactive oxygen species (ROS) can be upstream initiators of mitochondrial fission by activating Drp1 through PKC $\delta$ . Black and cols. recent research demonstrates that RhoA nitration is involved in LPS-induced acute lung injury in mice. They also found that PCK $\delta$ -mediated eNOS phosphorylation at T495 facilitate glycolytic switch in endothelial cells. We hypothesized that a disrupted presence of fission and fusion proteins occurs in monocrotaline (MCT)-induced pulmonary arterial hypertension rats. The mitochondrial fission/fusion related proteins, OPA1, MFN1, MFN2, Drp1, FIS1, and RhoA nitration, were investigated. We obtained statistically significant differences for FIS1, niRhoA, MFN2 and OPA1, which were overexpressed in MCT rats compared to control group. Our data provide evidence that fission and fusion mitochondrial proteins are altered in hypertensive rats lung tissue. We hope the study of mitochondrial dynamics may led to new therapeutics for PAH.



## Astrid Nallely Ramírez Romero

**Universidad de Sonora, México**

Mentor: Dr. Stephen M. Black, Department of Medicine

Other authors: Dr. Evgeny A. Zemskov, Dr. Qing Lu, Archana Kangath, Ferris Saad, Department of Medicine

Major: Health Sciences, MS Program

Title: *Pro-inflammatory Effect of Calcium Channel TRPV<sub>4</sub> Activation in Human Pulmonary Artery Endothelial Cells (HPAEC)*

Transient receptor potential (TRP) channels are important in regulating Ca<sup>2+</sup> concentration and signaling in the endothelial cells. We hypothesized that changes in intracellular calcium due to TRPV<sub>4</sub> activation can induce a pro-inflammatory response by downstream signaling pathways. We activated TRPV<sub>4</sub> by selective agonist, 4 $\alpha$ -phorbol-12,13-didecanoate (4 $\alpha$ PDD), and analyzed possible induction of transcription factor NF $\kappa$ B pathway followed by activation of pro-inflammatory cytokine gene expression. Using control and 4 $\alpha$ PDD-treated HPAEC and Western blot analysis, we demonstrated activation of cell signaling pathway IKK/I $\kappa$ B $\alpha$ /NF $\kappa$ B. Further, total RNA fractions isolated from control and 4 $\alpha$ PDD-treated cells were used for cDNA preparation and real-time PCR. Data obtained showed dose- and time-dependent robust induction of pro-inflammatory cytokines such as TNF $\alpha$ , IL-6 and IL-8. Taken together, our data clearly indicated that TRPV<sub>4</sub> activation and intracellular calcium elevation can lead to pro-inflammatory response in pulmonary endothelium due to, probably, calcium-induced mitochondrial dysfunction followed by oxidative stress.



## Esmeralda Ivonne Niño Padilla

**Universidad de Sonora, México**

Mentor: Jason X.-J. Yuan, PhD. Division of Translational and Regenerative Medicine, Department of Medicine.

Other authors: Ramon J. Ayon, PhD. Division of Translational and Regenerative Medicine, Department of Medicine.

Major: Chemistry-Biology and Health Sciences, PhD Program

Title: *Characterization of Ca<sup>2+</sup> Signaling in Peripheral Mononuclear Cells from Pulmonary Hypertension Mice Model*

Pulmonary arterial hypertension (PAH) is a progressive disease characterized by an increase in pulmonary vascular resistance that frequently leads to heart failure and death. Important findings evidence the participation of immune cells, which after their accumulation in lung tissue, can activate and produce pro-inflammatory cytokines, contributing to disease progression. Ca<sup>2+</sup> signaling mechanisms have been investigated in other cell types, like pulmonary arterial smooth cells (PASMC) of patients and animal models, where upregulated expression of Ca<sup>2+</sup> membrane receptors and channels contribute to an elevated cytosolic concentration, which promotes cell proliferation and migration, and diminishes apoptosis. However, the role of cytosolic Ca<sup>2+</sup> regulation and signaling hasn't been fully explored in immune cells. To make an approach, we isolated peripheral mononuclear cells (PBMC) from C57BL/6 mice by density gradient and evaluated its characteristics by hematological staining and flow cytometry. Ca<sup>2+</sup> single cell live imaging with Fura-2, a cell-permeant fluorescent indicator, was achieved under stimulation with PMA (phorbol 12-myristate 13-acetate) or cyclopiazonic acid (CPA). After live cell imaging, cells were stained using fluorochrome-conjugated antibodies for identification of cell populations. Cell morphology assessed by hematological staining and flow cytometry displayed the typical features of mononuclear cells. PBMC treatment with CPA during live cell imaging showed an increasing response of [Ca<sup>2+</sup>]<sub>cyt</sub> due to its releasing from intracellular stores. Due to expression of membrane markers, antibody staining revealed the cell populations that exhibited this behavior. Further studies in Ca<sup>2+</sup> regulation and signaling from animal models and patients' immune cells could provide data to elucidate its pathogenic role in disease development and/or progression.







## Joel Amir Darío Maldonado Tánori

**Universidad de Sonora, México**

Mentor: Dr. Eduardo Rozo, Department of Physics

Other authors: Tom McClintock, Department of Physics, Rafael García, Department of Physics

Major: Physics

Title: *Reducing the Impact of Projection Effects in Photometric Cluster Catalogues*

Photometric surveys seek to use the abundance and spatial distribution of galaxy clusters to improve our knowledge on dark energy. In photometric surveys we measure the richness of galaxy clusters, which is a count of the number of receding galaxies at a given redshift. Due to Hubble's Law, redshift can be regarded as an estimate of the distance to a galaxy. Uncertainty of richness measurements is influenced by mis centering and projection effects, which refer to the impact that structures along the line of sight have on the richness of a given galaxy cluster. In this work, we use data taken from the SDSS redMaPPer cluster catalog to test methodologies that reduce impact of projection effects in photometric cluster findings. We model the richness as a function of red shift with a quadratic function, noting that the narrower curves do not present projection effects. We proceed to calibrate the width of this functions as a function of redshift. In order to take projection effects into consideration, we fit a model composed of the sum of different quadratics, restraining the peak of the first quadratic to be near the measurements of true redshift and true richness. We assign a width to the first quadratic using our previous analysis. Measuring the richness of the quadratic at hand, we obtain and estimate of the richness with the projection effects filtered out.



## Sofía Alejandra Tovar Cabrera

**Universidad de Sonora, México**

Mentor: Dr. Roberto Guzmán, Chemical and Environmental Engineering Department, University of Arizona.

Other authors: Dr. Mariano J. García Soto Faculty of Chemical Sciences, Universidad Autónoma de San Luis Potosí, México; Marwan Abduljawad, Chemical and Environmental Engineering Department University of Arizona; Dr. Mario Enrique Álvarez Ramos, Nanotechnology Graduate Program, Department of Physics, Universidad de Sonora, México; Dr. Armando Lucero Acuña Department of Chemical and Metallurgical Engineering, Universidad de Sonora, México

Major: Nanotechnology, MS program

Title: *Synthesis and Characterization of Multifunctional Nanoparticles for Biomedical Applications*

The manipulation of matter allows obtaining nanostructured materials with specific and diverse photothermic, photonic, photoluminescent properties. Such is the case of hybrid nanoparticles combining two or more types of nanostructure materials, where each has a specific role within the main function for which it is designed. These functions can be given support, coating, encapsulation, recognition, and adhesion or promote changes in the system. The synthesis of nanomaterials by bottom-up techniques has permitted to obtain colloidal nanoparticles of gold, silver, silicon, titanium, and magnetite, which can be modified superficially with different materials and compounds. These particles can be characterized quite effectively since their physical properties including size, polydispersion, and zeta-potential can be readily obtained. In many cases, UV-Visible spectroscopy allows knowing the absorbance of the superficial resonance plasmon (SPR) of nanocomposites. The morphology can be corroborated by Scanning Electronic Microscopy (SEM). The design of these multifunctional composite promises future biomedical applications as in diagnosing diseases favoring the photoluminescence of the active compound used for detection, in addition to their application in other areas such as electronics and innovation technology.



## Itzel Arizbe Olivares Torres

**Universidad de Sonora, México**

Mentor: Dr. Roberto Guzmán, Department of Chemical and Environmental Engineering

Other authors: Dr. Yissel Contreras, Department of Chemical and Environmental Engineering, University of Arizona, Tucson, Arizona

Major: Nanotechnology, MS program

Title: *Development of Gold Biosensor Platforms for Detection of Biomolecules and Microorganisms*

Biosensors have applications in diagnostics, water quality, and food processing. Current challenges in the development of highly stable and specific biosensors involve the denaturation of immobilized proteins and low concentration of biomarkers of interest in fluid samples for diagnostics applications. In this work, clean gold films were modified with organic molecules to develop biosensing platforms using covalent attachment. The first step was to obtain gold surfaces terminated with amino or carboxylic acid groups using thiol self-assembled monolayers. X-ray photoelectron spectroscopy was used to confirm successful thiol attachment through analysis of the C 1s and S 2p photoelectron lines. Then, carbodiimide and glutaraldehyde crosslinking chemistries, organic molecules, including antibodies, were covalently bound to the modified gold surface. The gold films were used to detect proteins and cells and will be adapted to develop electrochemical sensing platforms. In a first biosensing test, biotin was attached to gold via carbodiimide crosslinking, followed by the specific binding of avidin-rhodamine, resulting in fluorescence at 610 nm. Horseradish peroxidase (HRP)-labeled secondary antibodies were used to confirm the immobilization of a primary antibody by the conversion of o-phenylene diamine and while measuring absorbance at 450 nm. After immobilizing specific anti-Bacillus subtilis flagellin and incubating in a live bacterial cell suspension, followed by a Gram stain, images were obtained using a metallographic microscope. The micrographs show a low affinity between the antibodies and bacterial cells. Future work will focus on the use of polyethylene glycol as permeating polymers to enhance the specificity of biosensing platforms and to explore development of gold nanoparticle biosensors.



## Sergio Alan Salguero Fahl

**Instituto Tecnológico de Sonora, México**

Mentor: Ash Scheder Black, UA Global, Director of Technology

Major: Software Engineering

Title: *Creation of a Virtual Reality Space for International Collaboration*

Tech.Global is a University of Arizona (UA) program that focuses on providing a real-world environment for students to hone their skills in software development. Students create custom software tools for the UA using emergent technologies like Virtual and Augmented Reality (VR and AR). The Sonoran Institute of Technology (SIT) is one of Mexico's leading universities in Software Engineering, but the program lacks the resources and infrastructure needed to delve into emergent technology research. Because VR and AR are different from traditional computing as to how they involve and inform the user, more possibilities emerge for software development. This project's goal is to create a virtual reality space where members from UA's Tech.Global and SIT can collaborate and share their work in a new way that promotes the exchange of knowledge. This space is meant to host meetings, lectures, and interviews, while also hosting a portion of Tech.Global and SIT's 360° visualization applications. These applications will serve the purpose of familiarizing the user with the UA's Microcampus environment, growing UA's global presence. The prototype will be built specifically for the Oculus GO VR headset, which is standalone and runs Android as the default operative system; however, the project's scope is open for porting to different platforms. SIT benefits from the experience and investment from Tech.Global, while Tech.Global gains from the manpower and different perspectives SIT team members can provide. The expectation for this implementation is to raise Tech.Global's productivity, whereas SIT's goals are to improve its research and academic standings.





## Rosalva Josefina Rodríguez Córdova

**Universidad de Sonora, México**

Mentor: Dr. Roberto Guzmán, Department of Chemical and Environmental Engineering, University of Arizona

Other authors: Dr. Armando Lucero Acuña, Universidad de Sonora, México, Dr. Robin Polt, Department of Chemistry, University of Arizona, Dr. Omar González Ortega, Universidad Autónoma de San Luis Potosí, México. Dr. Enrique Álvarez Ramos, Universidad de Sonora, México.

Major: Nanotechnology, PhD Program

Title: *Polymeric Nanoparticle Encapsulation of a Glycopeptide Morphine Analogue by the Nanoprecipitation Technique and its Release Study*

Nanoparticle drug delivery systems research has become one of the most promising areas in nanomedicine studies in the last decades. Mainly because this approach can overcome problems associated with cytotoxicity, dosage, decrease of drug undesirable interactions, and targeting. A large number of drugs can be used in these novel technologies, such as, peptides, proteins, plasmids, and small therapeutic compounds. The method and materials used to prepare these systems depend on the drug of interest. One of the most important materials used in this research is Poly-DL-lactic-co-glycolic acid (PLGA) which is a biodegradable and biocompatible polymer approved by the US FDA and European Medicine Agency (EMA). Several methods could be used to encapsulate drugs such as, simple and double emulsion, solvent evaporation and nanoprecipitation. In this work, we investigate the parameters for encapsulation, using the nanoprecipitation technique of a synthetic glycopeptide with analgesic effect. The resulting nanoparticles have potential and promising use in pain relief therapies, mainly because it can have a controlled and sustained release, therefore, prolonged drug action. The system obtained is characterized by dynamic light scattering (DLS) and laser Doppler electrophoresis, to obtain size distribution and zeta potential, respectively. The experimental release of the glycopeptide from PLGA nanoparticle is evaluated using the dialysis method under physiological conditions, concentrations are quantified using High-Performance Liquid Chromatography (HPLC). This study presents a clear and simple methodology for the encapsulation of a glycopeptide in PLGA nanoparticles for effective drug delivery applications.



## Ana Paula Peñuñuri Gómez

**Universidad de Sonora, México**

Mentor: Dr. Elizabeth Arnold & Dr. Stacey Weiss, School of Plant Sciences

Major: Biology

Title: *Do female lizards transfer their microbiome of the cloaca to their eggs to protect them to environmental pathogens?*

Many reptile species lack parental care. During the absence of the parents, microbial infection to eggshells can cause diseases and mortality. The transmission of microbial communities from parents to their offspring can be one of the strategies to confer protection to the eggs from pathogens. This research seeks to determine if laid eggs acquire protective microbiome from females when they pass through the cloaca during oviposition in *Sceloporus virgatus*. We analyzed the microbiome samples from the cloaca of female lizards and their eggs to characterize their microbial community. The main hypothesis of this study is that the microbiome of lizards eggshell is acquired when it passes through the cloaca that gives them protection from environmental pathogens. We used distinct groups of females: Control, Antibiotic-treated, and Dissected, and collected swab samples from both their cloaca and eggs swabs. We expect to find fewer microorganisms on eggshells from Antibiotic-treated females and from Dissected females (whose eggs did not go through the cloaca) in contrast with the eggs of Control females that went through the cloaca. The importance of this study lies in finding new information that supports other routes on the microbiome transfer from females to their progenies.



## Yutzil Edith Segura Ramírez

Universidad de Sonora, México

Mentor: Dr. Dominic Gervasio, Chemical and Environmental Engineering

Major: Chemical Engineering

Title: *Corrosion Rate of Steel in Water Delivery Pipes*

Factors such as water composition and flow rate influence the corrosion of metals in water delivery pipes. These factors vary in Tucson, producing variations in the rate of metal corrosion, leading to unpredictable pipe failure. The need for understanding pipe failure in terms of water quality has led to the construction of a test station by Tucson Water at The WEST Center (TWC). The Instant Corrosion Rate (ICR) is the rate of metal loss over a short interval of time, such as minutes, and is helpful for estimating pipe life in varying water conditions. This project compares the ICRs of steel in water measured in a practical plastic flow cell from the corrosion monitoring station versus a glass laboratory cell, considered ideal. In both cells were used a three-electrode system with a graphite counter electrode, a steel working electrode, and silver/silver-chloride reference electrode. All studies used a synthetic water, aqueous 0.01 M  $\text{Na}_2\text{SO}_4$ , as the electrolyte. The experiments were performed under two conditions for both cells: stagnant and bubbling air. The Stern Geary Method was used to obtain ICRs. The data obtained in both cells showed similar results for ICRs of steel in stagnant and bubbling air, proving that the plastic cell developed at TWC works very much alike an ideal glass cell and can be use in the station. This cell is to be used for online corrosion monitoring, allowing to obtain the real time corrosion rates of metal pipes in water at a rate much faster than gravimetric methods, which measure mass loss.



## Dylann Miguel Córdova Martínez

Universidad de Sonora, México

Mentor: Elizabeth Arnold, School of Plant Sciences

Other authors: Haley E. Williams & Joseph Spraker, School of Plant Sciences

Major: Biology

Title: *Do bacterial endosymbionts influence the sensitivity of fungi to anti-fungal metabolites?*

Plant health depends on complex interaction with microorganisms such as endophytes, which are fungi living inside plant tissue without causing disease. Endophytes often harbor cryptic bacteria with non-obligatory symbiotic lifestyles, known as endohyphal bacteria (EHB). We are testing the hypothesis that these bacteria can influence the sensitivity of fungi to natural and synthetic antifungal compounds, which in turn may affect the outcomes of plant-fungus interactions. To address this, we evaluate the growth rate and phenotypic changes of the fungus *Pestalotiopsis* sp. (9143), with and without its EHB, *Luteibacter mycovicinus*, when subjected to different antifungal compounds. To evaluate antifungal protection by EHB in biotic encounters, we tested the fungal response to previously isolated bacteria that produced antifungal compounds. The fungus normal growth pattern was altered but with no significant difference between EHB and control group. To assess whether EHB impact resistance to synthetic antifungals, we evaluated changes in fungal growth in the presence of cycloheximide and benomyl, a protein synthesis inhibitor and a beta-tubulin inhibitor, respectively. We found a consistent change in morphology and growth rate, dependent upon the antifungal concentration and the EHB presence, which could mean that the bacteria support the fungus enough to grow in the presence of the antifungal. These effects are variable and likely dependent on the antifungal specific mode of action. Little is known about this and other interactions, these results suggest that EHB may contribute to enhanced endophyte persistence when encountering natural and synthetic antifungals, which could be altering the fungi-plant interaction.





## Guadalupe Anaïd Serrano Corral

**Universidad Autónoma de Ciudad Juárez, México**

Mentor: Dr. Melanie D Hingle, Department of Nutritional Sciences

Major: Nutritional Sciences

Title: *Characterizing the Quality of Bread Products Donated to Food Banks: Nutrition Policy Implications*

Food insecurity, defined as inconsistent access to safe and nutritious food, affects 42 million Americans. Food banks increase access through the distribution of subsidized and donated food across community networks. Donated or rescued food comprises a majority of food bank inventory. In 2017, the Community Food Bank of Southern Arizona (CFBSA) developed a nutrition policy to reflect their commitment to client health, particularly regarding diet-related diseases. Bread and related products represent a major proportion of donated/rescued foods; thus, this food group was the first selected to undergo nutritional evaluation. This project's purpose was to develop a sampling protocol and evaluation plan focused on bread - broadly defined - in order to determine total amount, type, and quality of bread received by and determined to be in alignment with CFBSA nutrition policy (goal of 50% whole grain bread). A five-day sampling protocol was initiated, wherein all donated bread products received by the CFBSA were weighed and categorized as i) whole grain, ii) enriched grain (white or wheat) or iii) pastries. Products were further characterized based on variety (different product types). 7638.5 total pounds of bread were collected and categorized where seventy-one percent were enriched bread, 21% whole grains, and 8% pastries. These findings suggest that a majority of CFBSA's donated bread is composed by enriched products and pastries. National nutrition guidelines recommend at least half of consumed grains should be whole grains; thus, CFBSA's nutrition policy should be refined to encourage higher acceptance of nutrient-dense bread products through donations when possible.



# Programs

UNIVERSITY OF ARIZONA





## King Abdullah University of Science and Technology (KAUST) Gifted Program

This five-week intensive academic and research experience served gifted students from KAUST University in Saudi Arabia.

Students participated for 40 hours per week in research projects, field trips, and social events. Workshops included topics such as writing skills and oral presentation skills. Students also visited the highly-ranked McGuire Center for Entrepreneurship at the UA.

This program was a partnership of Study Arizona: Short-Term Programs and International Student Services of the UA, funded by the KAUST Gifted Student Program administered by the Institute of International Education (IIE).

Hannah Lanis, Enrichment Manager  
Cynthia Cox, KAUST Gifted Student Program

### **UA Mentors**

Andrea Achilli, PhD  
Armin Sorooshian, PhD  
Qing Hao, PhD  
Salim Hariri, PhD  
Grad students and lab team members

### **Students**

Ali Salman H. Alahussain  
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Hussain Redha M. Alkhayat  
Saud Nizar S. Alrasheed  
Yazeed Abdullah D. Jeddah  
Hadi Mohammad H. Homaidi

**Institute of International Education (IIE)**





## Research Skills Improvement & Learning Research Experience: On-Site

The Study Arizona: Short-Term Programs team was honored to travel to UNIMINUTO in Colombia to deliver programs on-site this summer. We worked with researchers on scientific writing in English, publication in peer-reviewed journals, and international conference strategies. We also provided a framework for researchers to obtain a higher level of recognition by the National Scientific Agency, COLCIENCIAS.

As a separate program, we supported undergraduate students as they participated in research projects under the supervision of UNIMINUTO professors.

We offered intensive workshops in scientific writing, scientific poster design, intercultural skills, and oral communication. We also offered our Graduate School Symposium, which provides knowledge about graduate school in the United States.

### **UNIMINUTO**

General Rector, Padre Harold Castilla Devoz  
Rector Jefferson Arias, PhD  
Provost Linda Guarín

### **International Office**

Mauricio Izquierdo, Director of International Initiatives  
Carlos Vasquez, Director of International Affairs Office,  
Bogotá

### **Writing Skills Improvement Program (WSIP)**

Robert A. Côté, PhD



## Research Skills Improvement & Learning Research Experience: On-Site *(continued)*

### Faculty

Benjamin Baron Velandia  
 Merceditas Del Pilar Beltrán Fletscher  
 Yolanda Bermúdez Sánchez  
 Carlos Julio Camacho Sanabria  
 José Antonio Camargo Barrero  
 Juan Gabriel Castañeda Polanco  
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 Wilder Hernández Duarte  
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 Ivonne Adriana Méndez Paniagua  
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 Carlos Andrés Sierra Virguez  
 Pedro Nel Urrea Roa  
 Juan Carlos Ureña Mejía

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 Leidy Yohanna López Pineda  
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 Valery Andrea Medina Rodríguez  
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 Laura Valentina Méndez Santamaría  
 Diana J. Mesa Fandiño

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 Juliet Nathaly Ramos Gallo  
 Joseph Alejandro Rincón Ramírez  
 Lisa Tatiana Sánchez Yela  
 Leimy Zulany Santana Pérez  
 José Luis Velásquez Pérez





## UNC Lookout Scholars: Borderlands Experience

The University of North Carolina at Chapel Hill (UNC) designed a course for this program – and to supplement efforts, the UA designed a short-term program to provide academic and learning experiences for participating UNC students.

The short-term program was a binational collaboration coordinated by Study Arizona: Short-Term Programs and UA Study Abroad at the University of Arizona. As part of this collaboration, the UA Department of Mexican American Studies and the Universidad de Sonora (UNISON) designed presentations, fieldtrips, and visits to offer borderlands experiences to participating students.

Students had the opportunity to conduct field work, interview, observe, write, transcribe, and organize data.

**UNISON staff and faculty**  
Rector Enrique F. Velázquez

**Office of International Education and Innovation**  
Manuel Valenzuela Valenzuela, PhD  
Maria Guadalupe Cruz Federico  
Marisol Delgado Torres

### Presenters

Beta Group  
Albergue “Camino a Casa”  
Secretaría de Educación Pública  
Universidad Pedagógica Nacional  
Gloria C. Valdez Gardea, PhD  
Colegio de Sonora  
German Palafox, PhD  
Mexican Red Cross  
Berenice Aguirre Castillo  
Nolvia Cortez Roman, PhD  
Returned immigrant students  
in UNISON  
José Guadalupe Rodríguez, PhD  
María Auxiliadora Moreno  
Valenzuela, PhD

### UA staff and faculty

Department of Mexican  
American Studies  
Anna Ochoa O’Leary, PhD

### UA Study Abroad

Harmony DeFazio, Executive Director,  
UA Study Abroad & Mobility Lab  
Jill Calderon, Assistant Director,  
Student Health and Safety  
Diane Nelson, Program Manager,  
Budgets & Contracts  
Veronica Ortiz, Study Abroad  
Program Assistant

### Special Projects

Thomas Opio, Special Projects  
Coordinator

### Consulate of Mexico

Ricardo Pineda Albarrán, Consul  
Sebastián Galván –Duque,  
Economic Media and Special Affairs

### Presenters

Laurie Melrood, LMSW  
Rebecca S. Mojardin  
Mauricio Magaña, PhD  
Cynthia Demetriou, PhD  
Operation Streamline  
Roberto Rodriguez, PhD  
Todd Miller  
Vincent J. Del Casino Jr., PhD  
Luis Coronado, PhD  
Gabriela Valdez, PhD  
Michelle McKelvey

### University of North Carolina at Chapel Hill

Abigail T. Panter, Senior Associate  
Dean, Undergraduate Education  
Carmen Gonzalez, Lookout Scholars  
Program Director,  
Undergraduate Retention  
Candice Powell, Interim Associate  
Director for Retention

### Students

Darian Abernathy  
Alex Betancourt  
Taleah Frazier  
Bianca Goodwin  
Morgan Teeters  
Daniel Vargas  
Yazmine Witherspoon



## English Teaching Program: A Mayan Experience

This program provided a multifaceted learning experience for undergraduate engineering students of Instituto Tecnológico Superior de Cananea (ITSC) and indigenous undergraduate students from Universidad Autónoma de Quintana Roo (UQROO).

Members of the UA Center for English as a Second Language (CESL) traveled to ITSC to train students in English teaching, and then those students visited the UA for two days to attend lectures, lab visits, presentations – and to receive the CESL certificate. The students then traveled to southeastern Mexico to teach English to Mayan indigenous students at UQROO.

This program had a strong service learning component. While spending a semester taking courses at UQROO, ITSC students volunteered in the community and engaged in diverse cultural and academic experiences.

### Center of English as a Second Language (CESL)

Nicholas Ferdinandt, Director  
 Summayya Granger, PhD, Associate Director  
 Francisco Javier Fuentes, Community Program Coordinator  
 Andy Holloway

### Instituto Tecnológico Superior de Cananea (ITSC)

Ramón E. López Fuentes, Director  
 Ana María Peralta Díaz, Coordinator

### Students

Yaritza Alejandra Urias Perez  
 Valeria Gómez Contreras  
 Miguel Angel Rodríguez Urias  
 Carlos Armando Rosas Luna  
 Aimee Katherine Hernández Soto  
 Valeria Michelle Esquer Ortiz  
 Bianca Rebeca Jiménez Tolano  
 Brandon José Zazueta Montiel  
 Jazam Emmanuel Martínez Ruiz  
 Zuleica Vega Morales  
 Clara Alejandra Bustamante Bastida  
 Karen Loreina Carpio Estebane  
 Paulina Coronado Rivas  
 Dayanna Itzajara Estrada Gonzalez  
 Erika Abigail Romero Salazar  
 Manuel Ernesto Espinoza Villegas



# Workshops



## Workshops

### ► Oral Skills Workshop

This workshop allows students to effectively communicate scientific research in a clear and concise manner by engaging with their audiences across disciplines.

*INSTRUCTOR: Kathryn Kellner*

### ► Writing Skills Workshop

This workshop provides students with the skills and techniques to develop a high standard scientific abstract.

*INSTRUCTOR: Robert Côte, Ph.D.*

### ► Scientific Poster Design Workshop

This workshop teaches students how to effectively design a scientific research poster that makes scientific research accessible to all audiences.

*INSTRUCTOR: Adrián Arroyo, Ph.D.*

### ► Scientific and Academic Culture in the U.S.

This workshop delivers an introductory overview of the best practices that characterize resource allocation at United States Research I universities. Students learn to navigate and internalize their roles within their research working groups, while enriching their knowledge of U.S. university culture.

*INSTRUCTOR: Adrián Arroyo, Ph.D.*

*(continued)*

### ► Intercultural Workshop

This workshop and presentation explores the concepts and importance of intercultural competency. The ability to communicate effectively and appropriately with people of other cultures is crucial in today's global marketplace.

*INSTRUCTOR: Nadia Alvarez Mexia, Ph.D.*

### ► Entrepreneurship Workshop

This workshop delivers an introductory overview and hands-on experience where students are inspired to become entrepreneurs, while they gain knowledge of the viability of their start-up ideas.

*INSTRUCTOR: Robert Johnson*

## Graduate School Symposium

► **The objective of the Graduate School Symposium** is to provide useful information about all aspects of graduate school, from the application process to funding opportunities.

Students are informed through talks, panels, workshops and direct interactions with faculty members, graduate students and program coordinators about the life of a graduate student in the United States.

Students have the opportunity to acquire cultural capital and valuable formal and informal knowledge about all aspects of graduate school; from writing a statement of purpose or obtaining a student visa, to choosing a right mentor and scholarships available.

This activity also offers different planning tools for students interested in pursuing scientific careers.

*Special guests: UNISON-Desert Museum Internship Group*





# Staff & Instructors



## DEAR STUDENTS

This experience represents an end, but at the same time a beginning. If you take action in transforming the future, you become a leader. Good leaders create change by promoting diversity and innovation to solve global issues. Global problems need multidisciplinary solutions, and multidisciplinary solutions need interaction between open-minded and creative people. Be that person. Be that leader who brings up a new idea, who eliminates differences, borders, and walls and brings people together to make this world a better place.

We hope this international experience helped you advance your professional and personal goals, meet wonderful people, and make future connections and strong friendships. With this experience, we hope you internalize how privileged you are in having this opportunity to become an agent of change that the world needs to benefit your countries.

Building an international community implies putting efforts and knowledge together to develop new ways of seeing the world and to be able to work together without boundaries.

~ Adrián Arroyo





## Nadia Alvarez Mexia, Ph.D.

**Director, Study Arizona: Short-Term Programs**

Since 2007, Nadia Alvarez Mexia has managed undergraduate research and academic programs at the University of Arizona (UA), bringing international students to the UA. These programs have been awarded by the UA, NAFFSA: Association of International Educators, CONICYT Chile, and the Institute of International Education (IIE).

Prior to joining the UA, Nadia worked for a decade in Mexico's higher education system as a teacher, mentor, and administrator with Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) in Monterrey and Mazatlán. She has expertise in developing curriculum and coordinating efforts with faculty, sponsors, and partners. She has participated as a keynote speaker and presenter at international conferences about her experience directing short-term programs.

Nadia obtained her bachelor's and master's degrees from ITESM and her Ph.D. in Teaching & Teacher Education with a minor in Language, Reading & Culture from the UA. She is a recipient of the Erasmus Circle Award, one of the highest honors from the UA's College of Education.



## Adrián Arroyo, Ph.D.

**Coordinator, Study Arizona: Short-Term Programs**

A former member of the pharmaceutical industry, Adrián earned his bachelor's degree in Chemistry and Pharmaceutical Sciences from La Salle University in Mexico City and completed his doctoral degree at the University of Arizona Center for the Study of Higher Education. His specific research interests are geopolitical transitions and economic forces in higher education. His aptitude with STEM subjects, coupled with his higher education expertise, provides a strong framework for creating academic and research programs for international students.

Adrián is a former student of the UA Summer Program "A Learning Research Experience" and a CONACyT (Consejo Nacional de Ciencia y Tecnología) fellow. He belongs to the Editorial Commission for the "Research and Education Journal" of the University of Sao Paulo. Originally from Mexico City, Adrián has completed research in the United States, Brazil, and Europe.





## Robert Côte, PhD

### Writing Skills Workshop

Robert received his Ph.D. in Second Language Acquisition & Teaching from The University of Arizona, majoring in sociolinguistics and minoring in pedagogy and program administration. He began his career 20 years ago when he taught ESL at a farm worker's camp for Literacy Volunteers of America. Since then, he has worked as an administrator, teacher trainer, and classroom instructor in university IEPs, community colleges, adult education centers, and public high schools in Miami, Florida; Nogales, Mexico; Madrid, Spain; Dubai, United Arab Emirates; and Guangzhou, China.

Robert is also a book-review editor for LINGUIST List and the associate editor of Arab World English Journal. Robert enjoys teaching all aspects of the English language, and his research interests include teaching writing, peer review, Generation 1.5 students, CALL, and special needs.



## Robert Johnson

### Entrepreneurial Skills Workshop

Robert is a student at the University of Arizona and is involved in multiple projects around campus including InnovateUA which is a student-led innovation and entrepreneurship hub, connecting students to resources and providing opportunities to make their ideas a reality. InnovateUA envisions a future where innovation and entrepreneurship are engrained in the student experience at the UA. Initiatives include Hack Arizona, Demo Day, Accelerator, Startup Weekend, and Pitchfest.



## Kathryn Kellner

### Oral Skills Workshop

Kathryn Kellner is a strategic communications consultant and educator with a practice spanning 25 years. Her unique focus on speech articulation, breath-thought connection, and the conscious use of body and gesture to impart meaning provides individuals the confidence for effective face-to-face interactions, strategic communication, and public presentation.

She is keenly adept at identifying, explaining, and integrating personality preferences as a tool to understanding communication preferences and habits. She imparts skills, techniques, and personally-tailored strategies that are applied in limitless ways, including basic public presentation, courtroom litigation, speech design and delivery, leadership training, strategies for improving relationships, support staff development, interview techniques, and program development.

## Grants and Awards

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▶ **NAFSA's Senator Paul Simon Spotlight Award, 2012**

Through its Senator Paul Simon Award for Comprehensive Internationalization, NAFSA: Association of International Educators recognizes institutions for overall excellence in internationalization efforts.

▶ **The Peter W. Likins Inclusive Excellence Award, 2007**

This annual award recognizes individuals, teams, and organizations who go beyond their assigned duties to make exemplary contributions to the University of Arizona through recruitment and retention of an excellent and diverse faculty, staff, or student body.

▶ **100K Strong in the Americas Grant**

President Obama launched 100,000 Strong in the Americas to increase educational exchanges in the Western Hemisphere and strengthen United States relations with the countries of the Americas through student mobility. Enhancing productive people-to-people ties is a key component of the partnership vision that underlies this policy.

▶ **Institute of International Education/ Ciência sem Fronteiras Grant**

This mobility program aims to plant the seeds of what could revolutionize the higher education research system, exposing Brazilian students and researchers to an environment of high competitiveness and entrepreneurship. The model is designed to allow top students and scholars to participate in research at some of the best universities around the world. This program also seeks to create an establishment of solid academic links between key institutions.

▶ **Designation of a Hispanic-Serving Institution (HSI) by the U.S. Department of Education**

The UA is one of three members of the Association of American Universities to earn this designation. The UA met initial eligibility requirements, including at least 25% of our students identifying as Hispanic, in 2016. The UA joins 105 four-year public institutions and only a few from Research I and the Association of American Universities that meet the criteria for eligibility for HSI designation.

▶ **Inter-institutional Program for Strengthening Scientific Research and Graduate Studies**

Grant/ Programa Interinstitucional para el Fortalecimiento de la Investigación y el Posgrado Científico

By linking researchers to outstanding students, this program contributes to high-level human resources education, while also strengthening research and increasing graduate prospects for affiliated institutions.

▶ **2018 Edith Sayre Auslander Established Visionary Award, Nadia Alvarez Mexia**

The University of Arizona (UA) Commission on the Status of Women (CSW) created the Vision Awards Program in 1999 to honor leaders who manage their units in ways that exemplify the vision set out by the Arizona Board of Regents (ABOR) Commission in 1990. The awards recognize individuals who cultivate diversity and advance the CSW goals relating to 1) Campus Climate, 2) Career and Professional Development, and 3) Issues of Equity and Inclusion.

▶ **2015 Award for Global Excellence, Adrián Arroyo**

The Global Excellence Awards recognize individuals or groups who have distinguished themselves locally, regionally, nationally, or globally. The awards recognize those with outstanding commitments to fostering global education and cultural bridge-building. Recipients of this award are selected based on many criteria, including furthering the cause of international education, fostering international exchange through long-term efforts, and substantially assisting international students.

▶ **KAUST Gifted Students Program**

Administered by the Institute of International Education (IIE), the King Abdullah University of Science and Technology (KAUST) offers the prestigious KAUST Gifted Students Program to allow talented Saudi high school graduates to navigate their undergraduate degree programs at leading U.S. research universities.

▶ **UA Office for Diversity and Inclusive Excellence**

Study Arizona: Short-Term Programs designed and coordinated a Women in STEM Seminar, which united undergraduate students from Sonora, Mexico for one week in Tucson, where they participated in innovative workshops, lectures, and other activities. The UA Office for Diversity & Inclusive Excellence sponsored and provided marketing support for this seminar in the form of a booklet to promote participant stories.



# Experience





## Confronting Global Challenges

By: Jordyn Stinnett, UA Global

Upon meeting Gabriel Vasquez, one gets an immediate sense that he is on track to change the world. He studied Mechatronics Engineering at Universidad Tecnológica Centroamericana in his home country of Honduras and has big plans to tackle social and environmental challenges on a global scale.

In 2017, he spent 10 weeks in Tucson as part of “A Learning Research Experience, Undergraduate.” Under the guidance of accomplished mentors, the program offers academic, professional, and cultural experiences for undergraduate students interested in the social sciences or STEM fields. Vasquez instantly clicked with his mentor, Peiwen “Perry” Li, a professor in the Department of Aerospace & Mechanical Engineering.

“When I first arrived at the UA, I met with Dr. Li and we had a two-hour chat. I told him about my background and interests, and he placed me on a research project involving 3D printed tubes for enhanced heat exchangers,” said Vasquez. “3D printing is familiar to me, and now I can find new applications for it. I’m also interested in energy transfer, so this project fulfilled many of my interests.”

Vasquez explored innovative designs for internal flow heat exchangers, specifically ones that are 3D printed, lowering the cost and waste associated with the manufacturing process.

3D printing is one of the pillars of a startup Vasquez founded with his classmates in Honduras. The venture is called Craft3D, pronounced “crafted,” and its mission is to employ technology to better the lives of Hondurans.

“We describe ourselves as an educational startup. We want to offer courses in robotics, electronics, and 3D printing,” he said. “We want to give people the ability to build their own technology projects so Honduras is known not only for our coffee, but also as a country that exports technology.”

Vasquez takes the concept seriously. He traveled to Tucson with a prototype of a 3D-printed robotic arm, designed with a specific audience in mind.

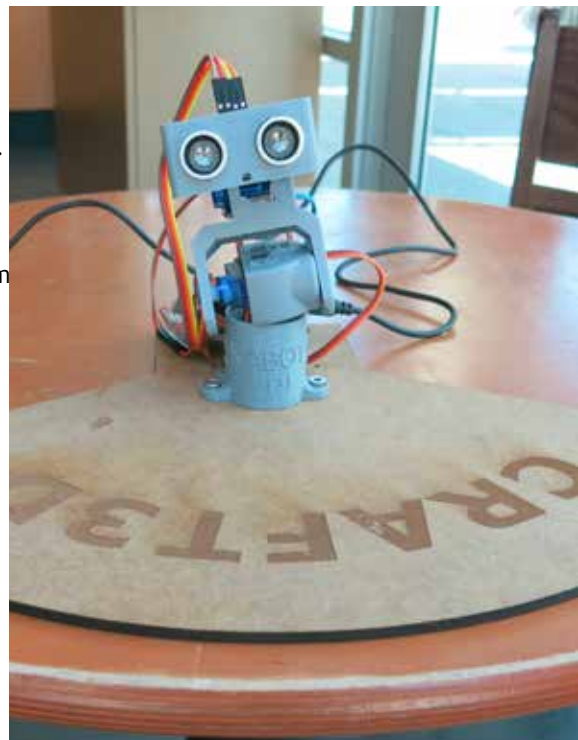
“This is meant to teach kids the principles of robotics and 3D printing. It was designed and made in Honduras. We named it K’Abot, a combination of the words “robot” and “k’ab” (the Mayan word for arm).”

Vasquez enjoyed showing off his invention and grasping new skills in Tucson. “I was involved in first-hand scientific research with a great mentor. The program also taught me how to apply for graduate school, which is a goal of mine. The personal experience was also great. I met many people from many backgrounds,” Vasquez added.

Vasquez is happy he decided to take the plunge to study at the UA. “I had a classmate in Honduras who insisted on me doing the UA summer program a year or two ago,” he said. “He kept insisting that I participate in the program, and I am very grateful to him. He coached me throughout the process.”

As Vasquez looks back on his experience, he has a vision for his future—one that promotes a more harmonious world.

“I believe scientific research eliminates boundaries between countries, and I would like to become a science diplomat. The summer program was a great experience for that goal. I plan to research in other countries and apply for graduate school in the United States, Japan, and China. I speak Spanish, English, Japanese, and am learning Chinese—I love learning new languages!”







## ► SPECIAL THANKS

*Mentors, colleagues, graduate students,  
 volunteers and other research team members*  
*Biosphere 2*  
*Bio 5*  
*CONAHEC*  
*Desert Museum*  
*Lauren Malanga, Volunteer @ Internship Program Coordinator*  
*at Arizona Sonora, Desert Museum*  
*UA Tech Parks*  
*UA International Student Services*  
*UA International Faculty @ Scholars*  
*UA Housing @ Residential Life*  
*UA Health Insurance Office*  
*UA Police Department*  
*UA Department of Mexican American Studies*

*UA SBS - Mexico Initiatives*  
*Universidad de Sonora (UNISON)*  
*Institute of International Education (IIE)*  
*UA College of Education*  
*UA College of Engineering*  
*UA Center of English as a Second Language (CESL)*  
*UA Global Units*  
*UA Graduate College (Graduate Symposium Lunch)*  
*Ana Paula Peñúñuri Gómez (Program Photography)*  
*Andrew Conlogue (Coordinator for the Desert Museum visit)*  
*UA Motor Pool*  
*UA Recreation Center*  
*UA Cat Card Office*  
*UA Cat Tran Office*  
*UA Meal Plan Office*





# CONTACT US

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