About TRIO
And the McNair Scholars Program

The Federal Trio Programs (TRIO) are Federal outreach and student services programs designed to identify and provide services for individuals from disadvantaged backgrounds. TRIO includes eight programs targeted to serve and assist low-income individuals, first-generation college students, and individuals with disabilities to progress through the academic pipeline from middle school to postbaccalaureate programs.

Designed to assist first-generation, low-income students and those who are underrepresented at the graduate and doctoral level, the program at Cal Poly Pomona was first funded in 1999. The Ronald E. McNair Postdoctoral Achievement Program is named for Dr. Ronald E. McNair, one of those who perished aboard the space shuttle Challenger January 1986.

The McNair Scholars Program at Cal Poly Pomona is a one- or two-year program designed to improve students’ research skills and prepare them for entering graduate schools and advanced study. This education grant provides an internship opportunity for students to learn how to do research, present their findings at a summer symposium at the national conferences, and successfully apply for and enter graduate school. Through the efforts of the students themselves, the faculty mentors, and the program staff, these students can achieve their goals.

McNair@cpp.edu
www.cpp.edu/~mcnair/

19th Annual
Ronald E. McNair Scholar
Undergraduate Research Symposium
Friday, May 25th, 2018

Presented by
Cal Poly Pomona’s
McNair Scholars Program

“True courage comes in enduring, persevering, and believing in oneself.”

- Dr. Ronald E. McNair
Thank you McNair Mentors!
Our students couldn’t have done it without you.

Dr. Kevin Autry  
Dr. Subodh Bhandari  
Dr. Scott Boskovich  
Dr. Nancy Buckley  
Dr. Todd Coburn  
Dr. Aubrey Fine  
Dr. Mehrdad Haghi  
Dr. Laila Jallo  
Dr. Chris Kim  
Dr. Adam King  
Dr. Reza Lakeh

Dr. Sara Langford  
Dr. Alejandro Morales  
Dr. Shelton Murinda  
Dr. Vilupanur Ravi  
Dr. Renford Reese  
Dr. Eleonora Rossi  
Dr. Viviane Seyranian  
Dr. Bharti Sharma  
Dr. Kai Smith  
Dr. Nicholas Van Buer

A final thank you to Cal Poly Pomona’s Undergraduate Research and TRIO Programs:

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A Message From The Director

Welcome to the Nineteenth Annual Ronald E. McNair Postbaccalaureate Achievement Program Symposium and Luncheon. I thank you for joining us in celebrating the achievements of our McNair Scholars, and I congratulate all the Scholars and Mentors for the wonderful presentations this morning.

The McNair Scholars Program has brought great distinction to Cal Poly Pomona, and the program continues to provide student Scholars with valuable research experience and encouragement that give them a distinct advantage when they undertake the demands of graduate school. The McNair Scholars Program has been a model for promoting academic success and for ensuring that underrepresented students pursue doctoral studies. Most of our Scholars hail from low-income, first-generation college backgrounds, and they have overcome economic, social, and cultural barriers on their academic journey. Few aspects of human endeavor are more stimulating than actions that nurture intellectual creativity among young individuals.

As Director of the program, I have had the privilege to interact with exceptional students, faculty, staff, and administrators. We are fortunate to have a wonderful staff and I am consistently awed and humbled by their dedication to the scholars.

I want to thank current and past McNair Scholars for continuing to demonstrate the power of moral integrity in their academic and personal lives, as they apply the virtues of enthusiasm, loyalty, cooperation, friendship, and industriousness. Since the inception of the program by Dr. Frank Torres in 1989, over 127 students have graduated with either a Master’s Degree or Doctorate of Philosophy in programs across the nation.
Dr. Manuel Diaz
Keynote Speaker

BA in Psychology, Cal Poly Pomona 2008
MA in Psychological Counseling, Columbia 2010
MA in Education, Claremont Graduate University 2016
Ph.D. in Education, Claremont Graduate University 2017

Dr. Manuel Diaz started his career as a psychology major with a minor in multicultural studies here at Cal Poly Pomona. During his time as a McNair scholar, Dr. Diaz felt that “the program quickly became home” to him: “from developing an original research study, collecting data, learning from workshops, going on field trip outings with students and staff, and memorably staying up way past my bedtime with my cohort in the dorms eating, laughing, and screaming at late-night hours made the experience all worth it.”

Now with his Ph.D. in Education, Dr. Diaz recognizes that “there is no direct path to where you think you will end up or what you will study.” Students need to “take risks in your academic and scholarly development, even if it makes you uncomfortable for a moment. Remember that graduate school is not forever and is only temporary. Based on what you learned in the McNair Scholars Program, begin graduate school with a strong idea of what areas of research you want to explore but be open to slight change and flexibility as you progress through your studies. Challenge yourself but also be certain to engage in self-care!”

Dr. Diaz is an assistant Dean of Students for Pomona College and is the Director for the Queer Resource Center at the Claremont Colleges. In addition, he has returned to Cal Poly Pomona as a lecturer in the Department of Ethnic and Women’s studies where he teaches courses on women, gender, sexuality, and diverse LGBTQIA+ identities. His research focuses on the lived and campus climate experiences of LGBTQIA+ college students, enacting allyship for underrepresented student populations (e.g. first-generation, low-income, students of color). He has a passion for teaching and for research and hopes to share these passions not only with his students, but with the McNair Scholars presenting their research here today.

Special Thanks To:
We wish to thank the following people for donations or pledges of travel funds for the Scholars to attend the annual McNair Symposium at UC Berkeley, as well as those who have given generously of their time and expertise.

Dr. Steve Alas  
Jorge Lupercio  
Dr. Michael Fage  
Dr. Jessica Kizer  
David Kok  
Laura E. Ayon  
Dr. Michael Fage  
Dr. Cristian Aguilar  
Mike Manalo-Pedro  
Audrey Paredes  
Dr. Frank Torres  
Dr. Brian Ramirez  
Dr. Manuel Diaz  
Dr. Erika Dejonghe  
Dr. Allison Vaughn  
Dr. Alejandro Morales  
Dr. Jack Fong  
Dr. Allison Vaughn  
Bruce Kennedy  
Dr. Mario Guerrero  
Glen Morrison  
Dr. Ricardo Quintero  
Dr. Kevin Austry  
Hsien (Ryan) Kao  
Tom Zasadzinski  
Dr. Bonny Burns-Whitmore  
Jessica Moronez  
Mary Claire V. Gager  
Adriana Granados  
Joy Tafarella  
Dr. Scott Boskovich  
Dr. Nancy Buckley

2017-2018 McNair Scholars
Scholar Abstracts and Biographies
Hillside Central #2

Ho Lun Chan

Mentor: Dr. Vilupanur Ravi

Title: Electrochemical Evaluation of Aluminum 6101 Foams for Proton Exchange Membrane Electrolyzer Cells

Abstract: Hydrogen gas is a renewable resource with three times the energy storage capability of gasoline. There is an increasing demand for its use in power generation, chemical synthesis and metallurgical processing. Current practices for hydrogen production, such as steam-reforming, are undesirable because of the resulting large carbon footprint. Proton exchange membrane electrolyzer cells (PEMCs) provide an efficient and pollution-free pathway to generate hydrogen gas. However, PEMECs suffer from short lifespan due to corrosion of materials used for the liquid/gas diffusion layer (LGD). In PEMECs, the LGD has the crucial role of managing the mass transport of water to the catalyst layer and the distribution of heat and current throughout the cell. Titanium mesh and carbon paper are the most commonly used materials for the LGD in electrolyzer cells. However, titanium mesh has low surface area and is not cost-effective. Carbon paper is not a suitable material for the LGD due to its inability to withstand the highly oxidizing environment at the anodic side of the cell. In addition, carbon paper is brittle, has a low liquid permeability and the corrosion byproducts will poison the catalyst. Due to the ineffectiveness of titanium mesh and carbon paper, aluminum 6101 foam (UNS A96101) is a potential alternative material for the LGD because of its high surface area, mechanical strength, thermal conductivity, commercial availability and low density. UNS A96101 foams with pore microstructures of 4-8%, 6-8% and 8-10% relative densities were studied with varying pore densities of 10, 20, and 40 pores per inch (PPI). The corrosion behavior of test specimens was evaluated through linear polarization resistance and Tafel tests in aerated 0.01M sulfuric acid solution at 60°C. Microstructural analysis was performed using scanning electron microscopy (SEM) to observe localized changes on the strut surface.

Biography: Ho Lun Chan is a second year undergraduate student at California State Polytechnic University, Pomona who majors in chemical engineering and minors in materials engineering and physics. Over the course of two years, he has been working with Dr. Vilupanur Ravi in utilizing electrochemical techniques to study the corrosion behavior of porous metal alloy for hydrogen production applications, whose research will also be presented at NACE Corrosion 2018 conference and AAAS-Pacific Division meeting 2018. In fall 2017, he served as the engineering lead for the Cal Poly Pomona I-Corps team funded by CSUPERB to develop a commercialization path for his team’s bioinformatics invention. On campus, he serves as the secretary for Materials Advantage organization and the peer mentor for Achieve Scholars Program. He is also a cohort for the McNair Scholar Program, Kellogg Honors College, Engineering Scholars Program and Achieve Scholars Program. His aspiration is to be able to understand the behavior of materials as a function of their structure, and to optimize material’s properties in accordance with its application. His long term goal is to pursue a Ph.D. in materials engineering where he can learn to develop new materials for energy and biomedical applications and to contribute his community through professorship, service and research. In summer 2017, he will be working at the University of Washington – Seattle as a research intern to study the fabrication and characterization of nanomaterials.
**Scholar Abstracts and Biographies**

**Hillside West #1**

**Julissa Loza Mendez**

**Mentor:** Dr. Eleonora Rossi

**Title:** Spanish Heritage Language Processing: Using Rosetta Stone to Impact Heritage Spanish

**Abstract:** Throughout America’s history, millions of individuals migrated to North America, bringing along their native language. The definition of “Heritage speakers” describes individuals who are typically exposed to the minority family’s language and the majority country’s language. In the academic system of North America, minority languages are rarely embedded into the schooling system, resulting in heritage speakers not being able to acquire literacy in the heritage language and become more dominant in the majority language (English). If a language is not properly used, the heritage speaker starts to undergo gradual attrition or “restructuring.” This means that language is extremely flexible and can undergo dramatic changes. The goal of this study is to start investigating if and to what extent engaging in relearning Spanish through a computerized program (i.e., Rosetta Stone) will affect proficiency levels for Heritage Spanish Speakers (HSS).

This is a two year research and our team is organizing with the company, Rosetta Stone; therefore, Rosetta Stone can donate some of their materials, such as the Rosetta Stone Advantage Program, for this research. Our team is in agreement with Rosetta Stone, who will provide us with a number of advanced Spanish learning license to carry out the project. Our team is finalizing the testing battery we will be using during the training. Some examples of the testing battery are language independent memory tasks and cognitive control tasks. In the next phase of the study, we are planning to test participants.

**Biography:** Julissa Loza Mendez is a third year undergraduate at California State Polytechnic University, Pomona who is studying Psychology. She enjoys volunteering, interning, and working with students. She has held positions in Educational Opportunity Program as a tutor, Los Caballeros Mariachi, Psychology and Sociology Peer Mentor, Social Justice Leader at the Women’s Resource Center, and the Prison Education Project Mentor which revealed a common theme in her involvements: leadership and the desire to work with students from diverse backgrounds. Julissa’s current research is on Spanish Heritage Language Processing and the results of relearning a heritage language through Rosetta Stone. She plans to receive her Ph.D. in Social Psychology where she can give back to her community through professorship, research, and mentorship. Her short term plans are getting more involved in her research in order to apply it to the community in Cal Poly Pomona and representing the C.L.A.S.S. department through A.S.I. (student government). Her long term plan is to find a position in Student Affairs to help create programs to support under represented students.

**Scholar Abstracts and Biographies**

**Hillside Central #2**

**Tai Tran**

**Mentor:** Dr. Laila Jallo

**Title:** Emulsion Based-Hydrogel Formulation to Deliver Ibuprofen

**Abstract:** Emulsions are often formed from a mixture of water, oil, and surfactant which distributes the oil in the form of microscopic droplets throughout the water. Emulsions have been widely used to deliver hydrophobic medicines that are soluble in oil. In this study, emulsion has been prepared using corn oil, medium chain triglyceride (MCT), and Tween 80 to deliver ibuprofen in the form of hydrogel. 2.5 ml of oil phases were prepared by mixtures of corn oil and 0%, 25%, 50%, 75%, and 100% MCT. 2.5ml of Tween 80 was added to the mixtures to create the phases that were ready to carry the drug. 750 mg ibuprofen was added to 5ml mixture containing corn oil, MCT, and Tween 80, and the entire systems was added drop wise with a period of 25 seconds to 20 ml of water to produce emulsion phases. Emulsions has been produced using with the combinations of corn oil, MCT, Tween 80 and water above. Viscosity of the mixtures were determined at 2.68cp, 3.47cp, and 2.88cp of 25%, 50% and 75% corn oil-MCT mixtures, respectively.

**Biography:** Tai Tran is junior Chemical Engineering student at California State Polytechnic University, Pomona. He is working with Dr. Jallo on the project of Emulsion-Based Hydrogel to Deliver Ibuprofen. The project intends to deliver ibuprofen in form of hydrogel. In the future, he hopes that people can use sticky pads containing ibuprofen to replace the solid and liquid tablets such as Advil, Ibuprofen, or Motrin. Tai was a McNair Prep student before he became a McNair Scholars in 2017. He plans to get a Ph.D. degree in Chemical Engineering in the next ten years. He will apply for graduate programs at in and out-of-state schools in Fall 2018. His ideal goal of education career is to teach and research at a university.
Scholar Abstracts and Biographies
Hillside Central #2

Andy Klaib

Mentor: Dr. Scott Boskovich

Title: Sound Sight: Aural Vision for the Blind

Abstract: While blind people lack sight, they generally have an enhanced sense of hearing. The goal of this research project is to study the possibility of making an assistive device that can detect objects in a room using wearable sensors, and then relay that information to a visually impaired person using spatial audio. A suitable way of detecting the objects in a room will be studied, such as by using microphones worn on a belt and acoustic beamforming. Different methods of relaying this spatial information using aural cues to the user will also be researched in order to find the most effective and intuitive method. The variables that can be experimented with include the pitch, amplitude, tone, rhythm, and overtones of the generated sound. These generated sounds representing the different objects will be artificially placed in the position of the obstacles by using 3D spatial audio.

Biography: Andy Klaib is a third-year undergraduate at California State Polytechnic University, Pomona who is studying Electrical Engineering. In his previous years at Cal Poly, he has participated in multiple hands-on robotics programs, such as Micromouse and the Northrop Grumman sponsored Unmanned Ground Vehicle project. Andy is passionate about the real-world applicability of electronics. In particular, he wants to use cutting-edge technologies to help improve the lives of the disabled. In his research, he is currently working on using virtual reality 3D audio to help the blind “see” using sound.

Scholar Abstracts and Biographies
Hillside West #1

Jesus Navarro

Mentor: Dr. Alejandro Morales

Title: The Relationship Between Language Brokering and Pro-Social Behaviors Among Latinx College Students

Abstract: Psychological literature has historically ignored the contributions immigrant children make to their families in the US. One example of such understudied contribution is language brokering (LB). That is when children of immigrants translate and interpret for their non-English speaking parents and other members of the family. Child brokers interpret in a variety of situations including doctor's office, government agencies, supermarkets, and department stores. They also translate documents such as, bank statements, letters from school, TV shows, etc. Research on LB is growing and illuminating the relevance it has on the child who plays this role and overall impact on the family. One question that remains unanswered is how LB may facilitate or impact the broker's pro-social behaviors. Hence, the purpose of this study was to test how the different components of LB (i.e., translating, interpreting, and feelings) may predict to pro-social behaviors among Latino college students who are active brokers. A sample of 678 participants answered a demographic questionnaire, the Language Brokering Scales, and the Prosocial Tendencies Measure. To answer our research question, we will run a series of correlations and hierarchical regression analyses. Ideas for theory, practice, and future research will be addressed.

Biography: Jesus Navarro is a third-year undergraduate student at California State Polytechnic University, Pomona majoring in Psychology with a minor in Spanish. Jesus has been doing research with Psychology Professor Dr. Alejandro Morales since his second year and is now co-authoring in one of his projects for his McNair project. Jesus’ current project investigates the relationship between language brokering and prosocial behaviors among Latinx college students. However, he plans to start his own project next year that will align with his specific research interests with adolescents and psychological disorders. Jesus plans to pursue his Ph.D. in Clinical Psychology and become a bilingual therapist and researcher to help his community. Jesus will be graduating in fall 2020 and hopes to dive straight into a Ph.D. program at a university of his choice.
Sergio Maldonado

Mentor: Dr. Alejandro Morales

**Title:** Understanding Gang Desistance Through A Strength-Based Approach

**Abstract:** Research in gang desistance has been ignored by researchers in psychology. Although researchers have started examining the desistance process, the studies referenced present a deficiency model that ignores the character strengths that enable men to leave gangs. Gang desistance in this study is defined as the final and permanent cessation of all offenses and gang related-criminal activities. The purpose of this exploratory qualitative study is to examine the process of gang desistance through a positive psychology and cultural framework and identify strengths associated with gang desistance. Three questions will be investigating are: 1) What are the specific strengths that promote desistance; 2) How did the strengths assist in desistance; and 3) Which strengths helped participants stay desisted? The sample is comprised of seven (N=7) former gang affiliated Hispanic/Latino males between the ages of 18-60 that were in a Southern Californian gang. Preliminary findings support Berger, Abu-Rayia, Heineberg, and Zimbardo’s (2016) model of gang desistance with perspective, realization, curiosity, self-regulation, and hope being strengths identified within the gang desistance process. A phenomenal emerged which identifies the influence of prison gangs on street gangs, and the complexity of gang desistance which needs further examination. The character strengths identified, and facilitators should be investigated more thoroughly to develop character strength-based programs, a method commonly used in Counseling Psychology, for Hispanic/Latino males.

**Biography:** Sergio Maldonado Aguifiga is a third-year transfer student at California State Polytechnic University, Pomona who is majoring in Psychology with a minor in Political Science. Through the McNair Scholars program and involvement in the non-profit sector, he aspires to return to the city of Pomona to be a tenured professor at Cal Poly, teach the next generation of scholars and professionals in psychology, and continue with his community engagement mentoring the youth. His research interests pertain to examining the intersection of positive psychology and psychotherapy with marginalized communities. More specifically, examining individual and group therapy processes and outcomes of incarcerated, formerly incarcerated, and at-risk urban youth, and the processes of gang desistance and reintegration of former incarcerated individuals into the community. Through his research, he aspires to develop individual-based, group-based, and school-based interventions aimed at fostering character strengths with an emphasis on gratitude. During the Fall of 2018, he will be attending Purdue University to pursue his Ph.D. in Counseling Psychology.

Thuan Nguyen

Mentor: Dr. Reza Lakeh

**Title:** Design and Testing of a Solar-Driven Wastewater Treatment Unit for Off-Grid Applications

**Abstract:** The research team at Cal Poly Pomona, with the support of Metropolitan Water District of Southern California, is developing an off-grid solar-powered greywater treatment system for non-potable use in single households. The system is comprised of a three-stage treatment: microfilters, solar-driven reverse osmosis membranes, and ultraviolet disinfection unit. The product of this project is capable of reclaiming 90 gallons of water per day while recovering approximately 60% of residential greywater. The design of the system will remove traces of organic and inorganic chemicals, and particles of dirt, food and others. The team has built and tested a preliminary design of the greywater treatment system to address the mechanical controls, and electrical aspects of the overall system for future use. Based on data collection and analysis of Version 1, an optimized and more consumer-friendly Version 2 has also been built and is continuing to be tested. The energy consumption of Version 1 averaged 3 kWh/kgal; the recovery rate averaged 65% at optimal operating pressures of 70 psi to 110 psi. For Version 2, the ultimate energy consumption is about 2.7kwh/kgal while the recovery rate average 50% for operating pressures from 100 psi to 115 psi.

**Biography:** Thuan Nguyen is a fourth year Mechanical Engineering student at California State Polytechnic University, Pomona. His research interests are in mechanical control systems and renewable energy applications. His long term academic plans adhere to the advancement of engineering educations. Since 2017, he has participated in Decentralized Renewable Off-grid Wastewater Treatment (DROWT) project, overseen by Dr. Reza Lakeh, Dr. Ali Sharbat and Dr. Kevin Anderson. The DROWT project won second place at the Metropolitan Water District College Green Expo 2017, and has also been recognized at the regional, national and international level at SCCUR 2017, ASME’s IMECE 2017, and WRPI 2017-2018.
Kate Ly

Mentor: Dr. Todd Coburn

Title: Characterization of Welded Stainless Steel PH 15-5 Joint Produced by Additive Manufacturing

Abstract: Additive manufacturing (AM), commonly known as 3D printing, has been receiving a tremendous amount of attention for its potential to revolutionize the manufacturing industry. This type of processing has the ability to rapidly produce highly complex geometries while eliminating costly, part specific tooling. Despite the success of existing methods, this manufacturing technique has yet to become ubiquitous though out industry. AM as a manufacturing choice remains less competitive compared to conventional manufacturing methods. This is due to current technological limitations including the strength of printed parts and manufacturing size limitations.

As the complexity of 3D printed parts increases, the ability to attach multiple parts together requires investigation. The physical characteristics of welded, 3D printed material has yet to receive significant attention from industry researchers. In order for these types of joints to become a common design feature, the mechanical behavior of the joint must be well understood.

Although a number of studies on tensile properties of AM parts have been performed, endurance properties of AM parts have been the subject of only limited studies, particularly with respect to weld joints. The objective of this study is to investigate the structural integrity and microstructures of welded joints subjected to tension and fatigue loading. For this study, the common aerospace material, PH 15-5 stainless steel alloy has been selected and the method of attachment used is Gas Tungsten Arc Welding (GTAW). A comparison is made between the mechanical behavior of welded joints using a substrate of conventionally formed 15-5 plate and EOS’s Direct Metal Laser Sintering AM machine test specimens. The static and endurance data of the material are generated by tensile and fatigue testing these specimens.

Biography: Kate Ly is senior at California State Polytechnic University, Pomona. Her major as an undergrad is Mechanical Engineering and prior to Cal Poly, she studied at East Los Angeles Community College. During this time, her passion for automotive design and welding led her to join Huskie Garage team to build a fuel-efficient vehicle and compete in the Shell Eco Marathon. Her current position as a product engineering intern at Arconic Fastening Systems has allowed her to begin research on the mechanical behavior of welding 3D printed structural joints. Upon graduating, she plans to start a Master program in Mechanical Engineering with a focus on materials and solid mechanics. Her long-term plans include finishing her Ph.D. in the same field and pursue a research based career.

Tania Roa

Mentor: Dr. Aubrey Fine

Title: Reading with Therapy Dogs

Abstract: Animal-assisted interventions, now considered an effective complimentary therapy has been applied and studied with numerous special populations and environments including educational settings. Research now demonstrates that animals may help reduce the anxiety that children experience in the classroom and promote numerous cognitive, emotional and educational benefits including helping children learning how to read. There are many programs incorporating dogs into educational and therapeutic settings that are created in order to provide children a sense of comfort during difficult tasks (in this case it is reading). The purpose of this study is to evaluate whether a reading dog program can help improve a child’s reading speed, accuracy, and prosody. Utilizing pre and post-tests for the program, the children’s reading scores can be compared before and after the intervention. There will also be observational data collected that will closely monitor the specific aspects of reading stated above. This observation will focus on the number of errors and types of errors the child makes. By following the protocol behind the measurement Dynamic Indicators of Basic Early Literacy Skills, the data can be made quantifiable. The reason behind this type of data is in order to get more insight on why the program is beneficial or not. Our hypothesis is that the children will have fewer errors in reading when the live dog is present (during the program rather than before). The main factor that has led to this prediction is the calming effect animals have on children. When the children feel less stress, it is assumed that they will be more able to focus on the task at hand in a more relaxed manner.

Biography: Tania Roa is a fourth year undergraduate at California State Polytechnic University, Pomona. She is a member of the McNair Scholars Program and of the Psi Chi Honor Society. Her current research is an in-depth evaluation of a reading dog program to investigate whether it is beneficial for the children. She plans to get her Master’s degree in clinical social work, then work her way into getting her Ph.D. These degrees will give her the resources and experiences needed to learn how to help people with disabilities. Her short term plans include furthering the research in animal-assisted interventions. Her long term plans are geared towards building her own animal-assisted therapy based practice. During the fall of 2018, she will be applying to various graduate school programs.
Tanya Orla

Mentor: Dr. Adam King

Title: The Colors of Student Success: Equity and Achievement in Los Angeles Unified School District Graduation Rates

Abstract: There are many potential factors that could play a role in determining high school graduation rates. The purpose of this study is to identify factors influencing graduation rates among 115 non-charter Los Angeles Unified School District high schools for the 2015-2016 school year. Multiple linear regression will be used to model graduation rates based on demographic data and other relevant factors. This data is from the School Report Card summary that is annually released by the Los Angeles Unified School District.

Factors being taken into consideration in this observational study are the proportion of students who identify as African American, American Indian, Asian, Filipino, Pacific Islander, and White. In addition, we will also include the proportion of students who are on track to pass all A-G courses, the proportion of students who know which A-G courses they need for college, and the proportion of students who know their current progress towards meeting the A-G requirements. Analysis of these models will determine if any of these predictors, whether alone or in combination, are associated with graduation rates. These models will be used to explain disparities in graduation rates between the subset of 115 non-charter high schools.

Testing the hypothesis at a significance level of 5%, this model resulted in being highly significant (p-value: 5.63×10^-18). Thus, at least one of the variables provides information regarding graduation rates. After constructing 95% confidence intervals for every coefficient estimate, the proportion of students who are on track to complete the A-G requirements was found to be significant in this model. The eight remaining predictor variables were not associated with graduation rates.

Biography: Tanya Orla is a fourth-year applied mathematics and statistics undergraduate student at California State Polytechnic University, Pomona. She is a college tutor for the Compton Unified School District and enjoys mentoring students who are interested in pursuing the sciences. Her current research involves building multiple linear regression models for the 2015-2016 school year high school graduation rates in the Los Angeles Unified School District. She has presented preliminary results at the annual Research, Scholarship, and Creative Activities Conference on her campus. She is graduating during the summer quarter of 2018 and plans to pursue a master’s degree in applied statistics. She plans to explore machine learning through her graduate studies.

Raymundo Gonzalez

Mentor: Dr. Mehrdad Haghi

Title: Investigating the Effect of Deformation on Mechanical Properties of a 2-D Pantographic Metamaterial

Abstract: The growth of additive manufacturing continues to be driven in part by the ability to produce complex geometrical parts at reduced costs. Mechanical metamaterials are materials that possess properties obtained from the structure of the material in addition to those provided by its composition. This research investigates the properties of a 2D pantographic sheet, a material composed of two bidirectional layers of parallel beams joined by cylindrical pivots. Previous testing of the structure demonstrates large amounts of resilience and toughness. This research studies the effect of uniaxial deformation on the mechanical properties of the 2D pantographic sheet.

Biography: Raymundo Gonzalez is a junior at California State Polytechnic University, Pomona who is studying Mechanical Engineering and minoring in Mathematics. Having transferred from East Los Angeles College in 2016, he continues to serve students at his community college’s Learning Assistance Center as a math and science tutor while mentoring underrepresented students through the university’s Reading, Advising, and Mentoring Program. His current research explores the mechanical properties of metamaterials to garner info on their potential applications. He plans to receive his Ph.D. in Biomedical Engineering to pursue research that benefit the well-being of his community while preparing the next generation of engineering students. His short-term plans include research into biomaterials, participation in multidisciplinary research projects, and the continued service to lower-division students both at the community college and university settings. His long-term plans involve utilizing his knowledge for the aid and well-being of society. He will be investigating and applying for graduate schools in Fall 2018.
Scholar Abstracts and Biographies
Hillside Central #2

Steven Ochoa

Mentor: Dr. Vilupanur Ravi

Title: Aluminization of Nickel Base Superalloys by Pack and Slurry Cementation

Abstract: Aluminide coatings on Ni-base superalloys are quite effective in affording protection against high temperature corrosion in gas turbine environments. Pack and slurry cementation are two processes for the application of aluminide coatings. Both of these are processes activated by halide salts and result in chemical reactions that produce diffusion coatings and can be utilized to deposit aluminum, silicon, or chromium on the surface of metallic alloys. Under oxidizing conditions, the coated surfaces form a passivating oxide layer to protect the base metal from high temperature corrosion. In this study, reactive elements were incorporated into aluminizing packs and slurries and used to coat Ni-base superalloys (UNS N07208, UNS N06230, and UNS N07718). The characteristics of coatings applied by the pack and slurry processes, e.g., thickness, microhardness, microstructure and elemental distribution, were studied using a broad range of techniques, i.e., X-ray diffraction (XRD), surface profilometry, macrophotography, and optical and scanning electron microscopy with energy dispersive spectroscopy (SEM/EDS).

Biography: Steven Ochoa is nearing the end of his undergraduate work and will earn a degree in Mechanical Engineering. He intends to subsequently earn his M.S. and Ph.D. degree in materials engineering and to begin a career in materials research and development. His research experience includes bio-composite alternatives to plastic, surface-modified aluminide coatings on Ni-base superalloys, and nano-materials for hydrogen evolution reaction. These experiences have instilled in him an insatiable passion for understanding the mechanics of materials and how to manipulate them to benefit society. Steven is interested in nano-materials, polymer science, composites, and environmentally safe alternatives to harmful ubiquitous materials being used today.

Scholar Abstracts and Biographies
Hillside West #1

Carissa Tang

Mentor: Dr. Kai Smith

Title: How Queer Hip Hop Artists Cultivate a Space on the Internet

Abstract: By creating a space on the internet, Queer Hip Hop artists can expand their audience and create their own agency in controlling their respective social media. This is highlighted especially in the political climate of the United States today, where mainstream media shows members of the Queer community as well as the Hip Hop community in an increasingly positive, yet still negative light. Alternative media that have traditionally been a haven for LGBT+ creators are increasingly filtering or even censoring LGBT+ creators, especially artists relying on social media to promote their work.

The focus of this project is to analyze the internet spaces of ten US-based Queer Hip Hop artists by collecting top comments and other auxiliary data from five of their top individual songs (songs that are not collaborations) published online within the past decade. Emphasis will be on the lyrical content as well as the visual content of the music videos. By doing so, this compilation of primary sources will test the hypothesis that these individual artists are cultivating a political space of their own.

Biography: Carissa Tang is an Anthropology Major and an English Minor. Their interests are in sociolinguistics, particularly examining the correlation and intersectionality of politics, gender, race, sexuality, and the Internet as a socially active and artistic space. Currently, they are conducting research under the mentorship of Kai A. Smith, MSLIS with the Ronald E. McNair Post-Baccalaureate Achievement Program.
Scholar Abstracts and Biographies
Hillside West #1

Success Carter

Mentor: Dr. Renford Reese

Title: A Policy Analysis: Human Sex Trafficking in Los Angeles County

Abstract: The United States is a target of human sex trafficking internationally and domestically. Though until recently, most of the focus has been centered on human sex trafficking as an international issue. Human sex trafficking within the U.S. is progressing at such an alarming rate that current estimates on the issue are limited. All in all, scholars are still doing their best to raise awareness and aid anti-human sex trafficking efforts within the states. This thesis aims to address the issue of human sex trafficking on the local level, using Los Angeles County as a tool to gauge the efficacy of current public policy regarding the issue. The outcomes of this thesis will provide that current policy is making strides toward solutions locally, however there is more fieldwork that need to be done. Also, there is a need for more collaborative efforts among government agencies and nongovernmental organizations to yield more awareness of the issue locally, and to lead the way for other local governments to evaluate their anti-human sex trafficking policies.

Biography: Success Carter is a fourth-year undergraduate at California State Polytechnic University, Pomona who is studying Political Science. In her previous years, Success has served as an Orientation Leader, Leadership Development Director of Black Student Union, and is currently fulfilling her role as Black Advance President. Her research examines the causes and consequences of sex trafficking and the policy options that can mitigate this phenomenon within the County of Los Angeles. Success plans to attend law school and receive her Juris Doctorate in criminal law. While in law school Success has a goal to continue her research regarding sex trafficking. Furthermore, she wants to have the capacity one day to influence legislation around this issue. During the winter quarter of 2017, Success will be applying to in and out-of-state law school programs.

Scholar Abstracts and Biographies
Hillside Central #1

Salar Tabesh

Mentor: Dr. Vilupanur Ravi

Title: Corrosion Resistance of Al/Al2O3 Composites Produced by Directed Metal Oxidation

Abstract: Ceramic matrix composites (CMCs) couple the wear resistance of ceramics and the ductility of metals. They also can provide an alternative to the difficult issue of shape formation confronting all-ceramic components if they can be formed to near net shape. Directed Metal Oxidation is a method of fabricating CMCs to near net shape. The process can be engineered to produce a wide range of geometries of alumina matrix/aluminum composites with minimum machining and also allows for further reinforcement of the composite through the addition of constituents such as silicon carbide. In applications, e.g., pump impellers and housing, where a combination of erosion, wear and corrosion resistance are required, the CMCs could be an ideal choice. The focus of this study is to investigate the Corrosion Resistance of Al/Al2O3 Composites produced by Directed Metal Oxidation. In this research, plates of Al2O3/Al composites were fabricated from an aluminum alloy using the Directed Metal Oxidation process. Coupons were prepared for a series of tests to characterize the corrosion behavior, hardness and erosion/wear resistance of this ceramic matrix composite material. Microstructural characterization of the composite was accomplished through scanning electron microscopy coupled with energy dispersive spectroscopy (SEM/EDS) and optical microscopy. Hardness tests—both macro and micro—were conducted in different regions of the composites. The erosion resistance of these composites were determined using slurry abrasion and rotating pin tests.

Biography: Salar Tabesh is a third year Chemical Engineering student at Cal Poly Pomona. He transferred to Cal Poly Pomona from Santa Monica College to gain hands on experience with a variety of engineering projects. He has participated in the NASA NCAS Scholar's Robotic Competition at the Armstrong Flight Research Center and won 1st place. His first exposure to an undergraduate research project at Cal Poly Pomona was in Modelling Diffusion Profiles of Aluminide Coatings. Currently, his current research under Dr. Vilupanur Ravi, involves fabrication and testing of Ceramic Matrix Composites. His goal is to pursue a Ph.D. in Materials Engineering, working on developing new materials for engineering applications, and ultimately return to academia to share his knowledge. During the fall quarter of 2018, he will be applying to graduate school programs.
Angel Perez

Mentor: Dr. Nancy Buckley

Title: Investigating the RAW 264.7 Cell Density-Dependent Effect of Garlic (Allium sativum) on Lipopolysaccharide Stimulated Tumor Necrosis Factor-α Secretion

Abstract: Garlic (Allium sativum) is used to remedy many diseases and known to modulate the immune system. Macrophages are key cells of the immune response, and are able to destroy pathogens. Macrophages not only are able to phagocytose pathogens, but are able to send a message, through cytokines, to other immune cells to aid against foreign agents. Cytokines are proteins used by immune cells to direct an immune response. We focused on tumor necrosis alpha (TNF-α) which is involved in systemic inflammation and critical for resistance against infections. Our laboratory has found that an aqueous garlic extract stimulated lipopolysaccharide (LPS)-induced TNF-α secretion from J774A.1 macrophages. LPS, found in the outer membrane of Gram-negative bacteria, stimulates cytokine production from macrophages. Also, our laboratory has found that, at a specific cell density, garlic stimulates LPS-induced TNF-α in J774A.1 and primary macrophages but has no effect on RAW264.7 macrophages. Thus, we set out to do a comparative study of garlic's effect on LPS-induced TNF-α secretion from RAW264.7 cells plated at different densities. RAW264.7 macrophages were plated at 5x10⁵ cells/ml, 2.5x10⁵ cells/ml, 1.25x10⁵ cells/ml, 6x10⁴ cells/ml and treated with an aqueous garlic preparation in the presence or absence of LPS (100 ng/ml). After 24-hours of treatment, cell supernatants were collected and TNF-α secretion was quantified by Enzyme-Linked Immunosorbent Assay (ELISA). Our preliminary findings show that garlic does not alter LPS-induced TNF-α, suggesting that garlic's effects are only cell-type dependent and not cell-density dependent.

Biography: Angel Armando Perez is a second year undergraduate student at California State Polytechnic University, Pomona where he studies Biotechnology. In addition, he has volunteered multiple hours at local hospitals and has participated in a medical brigade at a developing country. His career goals center on treatment towards chronic cardiovascular illnesses, as well as the advancement of drugs used to treat severe skin conditions. To that end, he will be pursuing a masters in Biology to be further immersed in the field before applying to medical schools.

Shea Duarte

Mentor: Dr. Kevin Autry

Title: Conflicting Effects of Warnings and Preexisting Attitudes on the Acceptance of Misinformation

Abstract: Research has shown that information that is initially assumed to be valid but is later retracted is often still used to inform subsequent behavior. Various conditions have been noted to mitigate or enable the persistence of misinformation such as the strength of the correction, the presence of warnings, or the inclusion of alternative options. A study by Ecker et al. (2013) found that congruence with preexisting attitudes increased an individual's reliance on misinformation and decreased the effectiveness of retractions. Another study conducted by Ecker, Lewandowsky, & Tang (2010) showed that presenting specific warnings about the continued influence of misinformation successfully reduced the reliance on misinformation by leading participants to process information more critically. In the present study, we set out to determine the comparative effects of preexisting attitudes and warnings on misinformation and how they interact. We will assess participants' preexisting beliefs on a target topic before exposing them to a mock news article that contains misinformation. The articles will either be preceded by a warning about the continued influence of misinformation or not. Additionally, the misinformation will either be consistent or inconsistent with participants' preexisting beliefs. The continued influence of misinformation will be measured in a final assessment that will give participants an opportunity to mention the retracted information if it has been retained. We hypothesize that we will find a main effect of preexisting attitudes, with belief-consistent misinformation leading to more reliance on the misinformation than belief-inconsistent misinformation. Additionally, we expect to see a main effect of warnings, with the presence of warnings resulting in less reliance on the misinformation than when there is no warning presented. Lastly, we hypothesize that there will be an interaction between these two independent variables, such that in the belief-inconsistent condition, subjects will rely on the misinformation less often when they are provided with a warning than when they are not. However, in the belief-consistent condition, subjects will rely on the misinformation equally in the warning and no warning conditions.

Biography: Shea Duarte is a third year psychology major at California State Polytechnic University, Pomona. She serves as a peer mentor in her department and as an executive board member for Cal Poly’s chapter of the International Honor Society in Psychology, Psi Chi. Her current research in cognitive psychology looks at factors that effect the processing of misinformation and how the misinformation effect can be mitigated. Additionally, she is conducting research in a cognitive neuroscience lab that examines the role of the prefrontal cortex in long term memory encoding. She plans to earn a Ph.D. in cognitive psychology in order to commit herself to the advancement of the field and to mentor and encourage others to pursue research as well. She will be attending a summer research program at Purdue in the summer of 2018 and applying to graduate school programs in the fall.
**Scholar Abstracts and Biographies**  
**Hillside West #2**

**Anna Liu**

**Mentor:** Dr. Sara Langford

**Title:** Applicant Pool Characteristics of Pro-environmental Companies

**Abstract:** Businesses have been known to be greedy, self-serving, and harmful to the environment. However, it is a misconception that businesses and the environment must be at odds. Corporate social responsibility bridges the gap between both. Many studies have found that socially and environmentally responsible companies are more attractive employers to prospective job applicants. It may be possible that the applicant pool attracted to environmentally-friendly companies consists of highly qualified applicants. This study examines the characteristics of the applicant pool attracted to pro-environmental companies. Participants in this study viewed either a green job ad or a nongreen job ad and answered questions relating to organization attractiveness and prestige as well as their intentions to pursue a job with the organization. They also answered questions relating to conscientiousness and their environmental attitudes. Results and implications of findings will be discussed.

Keywords: applicant pool, characteristics, environmentally-friendly, businesses, companies, corporate social responsibility, conscientiousness, environmental attitudes.

**Biography:** Anna Liu is an undergraduate psychology major at California State Polytechnic University, Pomona. She will be graduating in spring 2018. She is particularly interesting in social and environmental psychology, specifically in pro-environmental attitudes and behavior and environmentalism in organizations. Her current research examines the potential for pro-environmental companies in hiring highly qualified applicants. She aspires to be a researcher investigating the connections between psychology and environmental issues to address current and future problems. Ultimately, she hopes to increase environmental consciousness and action at the individual and organizational level.

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**Scholar Abstracts and Biographies**  
**Hillside Central #1**

**Leanna Little Dog**

**Mentor:** Dr. Shelton Murinda

**Title:** Recombinase Polymerase Amplification for Rapid, Real-Time, Isothermal Detection of Shiga-Toxin Producing Escherichia coli at Point-of-Care

**Abstract:** The focus of this study is to develop a protocol for the early detection of Shiga-toxin producing E. coli (STEC) in the production and distribution of foodstuffs. This is a critical step in the prevention of STEC infections, which may sometimes cause life-threatening complications. STEC are a major family of foodborne pathogens of public health, zoonotic, and economic significance in the United States and worldwide. There is one published report on the use of RPA for the detection of STEC that produced results with high specificity, sensitivity, and predictive value with respect to detection of Shiga-toxin 1 and 2 (Stx1 and 2) genotypes. The study detected STEC in real time (5-10 min) with a limit of detection of ~5-50 colony forming units (CFU)/mL. The goal of this study is to achieve a lower limit of detection (<5 CFU/mL) as STEC, specifically O157:H7, can cause disease in very low numbers (2-2000 cells). Additionally, a protocol will be developed for detection of STEC in different matrices (meat, vegetables, etc.).

**Biography:** Leanna Little Dog is a third-year undergraduate at Cal Poly Pomona who has been studying Biotechnology since her sophomore year. During her years at CPP, she has been conducting undergraduate research through the College of Agriculture. Her research emphasizes treatment or prevention of diseases caused by E. coli. Leanna’s short-term plans include attending a summer research program at the University of Nevada Las Vegas, where she will research similar disease-causing microbial pathogens. Through this program she hopes to gain the knowledge and skills necessary to design her own research project. Her long-term goals are to assist in vital microbial disease prevention research. During the fall quarter of 2018, she will be applying to graduate programs and plans on earning a Ph.D. in Microbiology.
Patricia Galvan

Mentor: Dr. Shelton Murinda

Title: Determination of the Prevalence of Major Mastitis-Causing Pathogens in California Dairy Farms Using Polymerase Chain Reaction (PCR)

Abstract: The U.S. dairy industry in 2012 garnered $35.5 billion and California had $6.9 in milk sales. This industry is in constant jeopardy as a result of mastitis, a disease characterized by inflammation of the mammary gland. Bovine mastitis accounts for $1.8 billion per year and the cost per cow per year is $80. The objective of this study was to determine the prevalence of major mastitis-causing pathogens (i.e., Escherichia coli, Staphylococcus aureus, and Streptococcus species) isolated from bovine quarter milk (QM) samples in California dairy farms (San Bernardino Co.) and compare it with current prevalence trends. The data will determine if control methods or antibiotics utilized before can still be applied today. The study uses multiplex Polymerase Chain Reaction (mPCR) to identify the major mastitis pathogens present in QM samples (N = 233). The PCR protocol combines 3 aureus, E. coli, and three Streptococcus sp. pathogen-specific primers. The predominant causative agent of mastitis is Staphylococcus aureus in dairy operations, with a prevalence of ~43%. In this study, it is expected for S. aureus to be the predominant mastitis causative agent present in contaminated QM samples. A total of 169 milk samples have been tested with the multiplex PCR assay. 94 (56%) were positive for E.coli, 22 (13%) for S. aureus, 11 (6.5%) for more than one species, and 42 (25%) had no bacterial contamination. Our findings indicate that the environmental pathogen E.coli, has a higher prevalence in QM samples isolated from bovine milk.

Biography: Patricia Galvan is a proud Salvadoran-Mexican, low-income and first-generation student. She previously attended Citrus Community College where she earned three Associate Degrees. She is a Senior Animal Science major at Cal Poly Pomona who has been conducting research for the past two years. Her research project utilizes Polymerase Chain Reaction to confirm the identity of mastitis-causing pathogens isolated from bovine quarter milk samples. With the help of the McNair Scholars Program and her mentor, Dr. Shelton Murinda, she was able to develop a passion for research to the point that she now aspires to obtain a Ph.D. in Microbiology. Her success at the undergraduate level is attributed to possessing patience and respect towards others.

Jessica Saucedo

Mentor: Dr. Viviane Seyranian

Title: Turning an Idea into Social Change: Social Identity Framing Reduces Counter-Argumentation

Abstract: Social identity framing (Seyranian, 2014) argues that using specific language constructs (e.g., inclusive language) that tap into social identity increase persuasion during social change. Two different studies randomly assigned participants to read either an inclusive language (“we”, “us”) or non-inclusive language social change message and examines how many thoughts a person develops in response to the persuasive message (message elaboration). Study 1 (N=222) evidenced less opposed thoughts (counter-argumentation) in the high-inclusive condition than the low-inclusive condition, F(1,111) = 3.68, p = .056. Post-hoc analyses revealed that participants in the high-inclusiveness condition had a lower ratio between opposing thoughts and total thoughts than those in the low-inclusiveness condition, F(1,214) = 4.56, p = .034. Study 2 replicated the results of study 1 using a different research paradigm. Overall, this research suggests that inclusive language reduces counter-argumentation, thereby making individuals more susceptible to persuasion.

Biography: Jessica is a fourth-year undergraduate at California State Polytechnic University, Pomona who is studying psychology. She aspires to become a tenured professor at a land grant university where she can conduct research and teach the next generations of scholars and professionals in psychology. She is particularly interested in issues centered in community psychology and environmental psychology, specifically in closing the gaps in health disparities and food insecurities, preventing homelessness in both rural and urban communities, and promoting social and environmental justice. Ultimately, Jessica would like to use her background in organizational psychology and social psychology to create community initiatives, instill motivation in individuals to unify and become agents of pro-social change in their own communities, and improve physical built environments to better suit the needs and well-being of all individuals. In August of 2018, Jessica will begin her journey in receiving her Ph.D. in Ecological/Community Psychology at Michigan State University.
Scholar Abstracts and Biographies
Hillside West #2

Meice Hamad

Mentor: Dr. Renford Reese

Title: Examining the Characteristics of Student Leadership

Abstract: The college years of a student is a critical period for individual growth personally, socially, and professionally. Several studies have supported that student leadership positively influence collegiate experiences. This exploratory research aims to understand the dynamic characteristics of student leaders. It examines who these student leaders are, what motivates individuals to become leaders, and to what extent student leadership influences the individual. To further investigate this matter, ten presidents from organizations, across disciplines, were randomly selected to participate in a one-on-one interview to analyze the profiles of student leaders at a culturally diverse institution. It was hypothesized that there would be similarities in characteristics within the students. The results indicated that student leaders are: resilient and preserve through the challenges of leading an organization, emphasize the importance of diversity within teams, advocate for underrepresented students, benefit personally and professionally, and lastly, are motivated intrinsically to pursue leadership roles. The outcomes of this study are potentially beneficial for programs that aim to nurture future leaders and increase the professional development of undergraduate students.

Biography: Meice Hamad is a fifth-year undergraduate at California State Polytechnic University, Pomona who is studying Psychology and Business Entrepreneurship. In her previous years, she studied at Mount San Antonio College and continues to volunteer with numerous organizations while working a flexible job to fully dedicate herself to her academic commitments. Her current research delves into student leadership and diversity and its implications for the success of future teams. She aspires to receive her Ph.D. in Organizational Behavior where she can gain the tools needed to academically and socially benefit her community through professorship, research, and service. Her short term plans include expanding her McNair project regarding student leadership and continuously developing personally and professionally through life experiences. Her long term goals adhere to the promotion and advancement of higher education and opportunities for underrepresented individuals. During the fall of 2018, she will be applying to in and out-of-state graduate school programs.

Scholar Abstracts and Biographies
Hillside Central #1

Jesus Preciado

Mentor: Dr. Bharti Sharma

Title: Understanding the role of E-Class genes in Aquilegia

Abstract: Progenitors of the flowering plants only had reproductive structures, but with time, more sophisticated whorls of perianth organs surrounding the reproductive organs have evolved. Arabidopsis, a popular plant model system, has a simple floral plan that consists of four whorls of floral organs: sepals, petals, stamens and carpels. However, that is not the only floral plan seen in angiosperms; many novel organs have evolved, while conical organs have disappeared. Understanding these phenomena starts with the ABC model, which suggests that floral organ identity is established by the interaction of three classes of gene activity: A class alone determines sepals; A+B, petals; B+C, stamens; and C alone, carpels. Further research has established “E-class” are necessary for the normal function of B and C genes. In the proposed research, we will use Aquilegia coerulea (columbine) as a model system. Aquilegia has five types of floral organs, namely sepals, petals, stamens, staminodia and carpels. The presence of a novel whorl of floral organs—staminodia—raises many interesting questions. Using a reverse genetic approach (virus-induced gene silencing), we aim to silence Aquilegia SEPALLATA homologs and understand their role in floral organ establishment.

Biography: Jesus Preciado is a senior studying plant science at California State Polytechnic University, Pomona. His research interests span from agriculture, floriculture, and molecular biology. His current research focuses on the elucidation of floral organ identity genes in Aquilegia coerulea by utilizing a reverse genetics approach. During fall semester of 2018, he will be attending the University of Florida, where he will be pursuing a Ph.D. in plant molecular and cellular biology. His future careers goals are to further develop genotyping tools to improve breeding potential of long-lived tree crop species, and to start a biotechnology business centered around crop quality and productivity.
Joseph Wolf

Mentor: Dr. Subodh Bhandari

Title: Unmanned Aerial Vehicles for Precision Agriculture Using Multispectral Images and Machine Learning

Abstract: The focus of this study is to investigate the viability of Unmanned Aerial Vehicle (UAV)-based remote sensing and machine learning techniques with regard to measuring water and nitrogen stresses in crop production. The main advantage of UAV-based remote sensing is the immediate availability of high resolution data. Near infrared (NIR) images obtained using remote sensing techniques help determine crop performances and stresses of a large area in a short period of time. This in turn helps to optimize the amount of water, fertilizers, and pesticides using site-specific management of crops. However, for widespread usage of these techniques by the end users, the accuracy of remote sensing data must be validated using proven ground-based methods. Equally important is the reduction in the overall cost associated with these techniques. UAVs equipped with multispectral sensors and digital cameras were flown over lettuce plots at Cal Poly Pomona’s Spadra farm. Different rows of lettuce plots were subjected to different levels of water and nitrogen treatments. The soil moisture and nitrogen levels were determined prior to beginning the study. The multispectral images were used in the determination of vegetation indices including a normalized differential vegetation index (NDVI) that provide information on the health of the plant. Machine learning classifiers are developed using the Red-Green-Blue (RGB) images. A handheld spectroradiometer, water potential meter, and chlorophyll meter were used for ground-truthing. Correlations between NDVI, chlorophyll content, and water potential were analyzed. The developed machine learning algorithm was able to predict plant health to a great extent. Machine learning techniques, with sufficient validation, have the potential to provide significantly cheaper solutions to plant health assessment and crop monitoring.

Biography: Joseph Gaining Wolf is a fourth year Plant Science and Agronomy undergraduate at California State Polytechnic University, Pomona. Previously, Joseph completed degrees in animal science, integrated pest management, and agricultural technology at Mount San Antonio College. Joseph has over 30 years of ranching and farming experience throughout the US, and currently manages a 220 acre organic farm and acts as advisor to many others in the Southern California area. His current research is broadly focused on developing agricultural production techniques that are ecologically restorative. He plans to receive his Ph.D. in Rangeland Ecology with a focus on restoration. His short term plans include exploring rangeland management practices that improve quality of life for production animals, while providing for wildlife habitat and restoring native plant populations. His long-term vision is an agricultural industry that is an instrument of both equitable food production and environmental restoration. Over the summer of 2018, Joseph will be traveling throughout the US, Peru, and Costa Rica in order to expand his understanding of rangeland research and management, both nationally and internationally.

Anthony LeBeau

Mentor: Dr. Nicholas Van Buer

Title: Megasopic Faulting and Folds of the Big Maria Mountains, Riverside County, California

Abstract: The Paleozoic stratigraphy of the Grand Canyon has been overturned and attenuated in the Big Maria Mountains north of Blythe, California. Several structural geology studies of the range over the past 30 years have identified multiple late Jurassic to early Cretaceous deformation events. Adequately relating the geology of the range to Cordilleran Mesozoic tectonics will require determining the age of three metaigneous units: an augen gneiss, a quartz-epidote schist, and a fine-grained quartzofeldspathic gneiss. Their ages are undifferentiated and are either Proterozoic or Mesozoic. To refine the tectonostratigraphy of the range, a geologic map based on field data and satellite imagery was created with GIS software and samples collected for analysis using X-ray fluorescence and optical petrography. LA-ICP-MS U/Pb zircon geochronology was applied to the metaigneous units. Mapping confirms the overturned limb of a syncline in the field area and repetition of the overturned and attenuated stratigraphy suggests a detachment fault. Preliminary radiometric dating of zircons from the augen gneiss produced a mean age of 1.3 Ga. The quartz-epidote schist and fine-grained quartzofeldspathic gneiss provided a mean age of 178 Ma. The Jurassic units are genetically similar and differ in their fabric; the fine-grained unit being associated with a detachment-related shear zone. It will be necessary to investigate whether these trends persist within the range and regionally. Corroboration will provide a more complete geologic interpretation of the range and incorporation of its tectonic history into the mosaic of Mesozoic Cordilleran tectonics.

Biography: Tony LeBeau is a senior geological sciences major who will be graduating in June.
Karissa Vermillion

**Mentor:** Dr. Nicholas Van Buer

**Title:** Geochronometric Evolution and Cessation of the Mesozoic Magmatic Arc in the Central Mojave Desert, CA.

**Abstract:** This project presents reconnaissance U-Pb geochronometry and whole rock geochemistry from areally extensive granitoid bodies from the Central Mojave Desert, geochemically defined by the Newberry, Ord, and Granite Mountains adjacent to Victorville and Barstow, CA., and the Cadiz, Marble, and Bristol Mountains adjacent to Ludlow, CA. In contrast to other relatively well-studied large intrusive suites in the Mojave Desert generated by Mesozoic subduction (e.g. Western Mojave and Cadiz Valley Batholith), little work has been done on granitic bodies in the Central Mojave Desert. U-Pb ages, done at CSU-Northridge's Laser-Ablation Inductively-Coupled-Plasma Mass Spectrometer confirm that the Central Mojave Desert records two main episodes of magmatism: (1) widespread and voluminous Late Jurassic- Early Cretaceous granitoids ranging from monzonite to monzogranite, and (2) Late Cretaceous granites associated with the cessation of the Mesozoic magmatic arc at ~73 Ma in the Mojave Desert. Inherited zircon grains suggest Late Jurassic- Early Cretaceous granitoids intruded into older Jurassic and Triassic wallrocks and Late Cretaceous granitoids intruded into Western Mojave Batholith age wallrock (91-82 Ma). Cretaceous plutons can be divided into two groups based on geochemical correlations: (1) 91-81 Ma granitoids with about 61 - 73% SiO2, currently found in the Western Mojave Batholith and (2) 80 - 73 Ma granites about 5% richer in SiO2 for a given Fe-Index than group 1. Cretaceous magmatism in the Central Mojave Batholith is hypothesized to have undergone three stages (1) 91 - 82 Ma, (2) 81 - 78 Ma, and (3) 77-73 Ma. Stage 1 was emplaced into little or no basement based on low lead isotope values, and consequent stages were emplaced into thicker basement to the southeast as the arc migrated in the same direction. Stage 2 is characterized by a magmatic lull caused by the shallowing of the subducting slab associated with a buoyant oceanic plateau - leading to a minimal mantle wedge and little magmatism. In stage 3, large batholiths such as the Ludlow Batholith were emplaced at ~75 Ma and were generated by asthenospheric upwelling following a slab tear between dense oceanic crust and more buoyant oceanic plateau.

**Biography:** Karissa Vermillion is a fourth year undergraduate at California State Polytechnic University, Pomona who is studying Geological Science. She has previously interned at Oregon State University REU where she worked on Argon-Argon geochronology on large igneous provinces. Her current research entails studying the Jurassic and Cretaceous magmatic arcs in the Central/Eastern Mojave Desert and cessation of the Cretaceous arc at ~73 Ma using U-Pb geochronology, whole rock geochemistry, and oxygen isotopes. Karissa also works on detrital U-Pb geochronology on quartzites associated with Proterozoic-Paleozoic metasedimentary packages in the San Gabriel Mountains that may yield useful information on the tectonics of the time, such as the rift of Rodinia. She plans to receive her Ph.D. Geology where she can gain the skills needed to continue research in petrology and tectonics. Her future work will delve into the newly discovered Ludlow Batholith and what it can tell about slab tear magmatism.

Manuel Vejar

**Mentor:** Dr. Chris Kim

**Title:** EXAFS and μXRF Analysis of Arsenic Speciation and Spatial Distribution in Mine Tailings: Implications for Physical Weathering, Bioaccessibility, and Remediation

**Abstract:** In California, the mining and processing of mineral resources such as gold and silver ore deposits has resulted in large volumes of metalloid-bearing mine wastes, including arsenic, which remain largely untreated and exposed, threatening the health of humans and the environment. Determining the chemical speciation and bioaccessibility of arsenic in mine wastes is critical to assessing the potential toxicity. Bioaccessibility is dependent upon physical and chemical properties of the waste materials, such as particle size, surface area, initial arsenic concentration, arsenic speciation, and arsenic spatial distribution; however, the relative contribution of each of these factors is insufficiently understood. X-Ray absorption spectroscopy and X-Ray fluorescence techniques that target arsenic species were applied to analyze size-sorted mine-tailing samples collected from several sites of the Empire Gold Mine, Grass Valley, CA, USA. XRF maps of 30 μm thin sections of selected size-sorted samples, contrasting As and Fe, were produced to study the relationships between arsenic’s spatial distribution and its chemical speciation. EXAFS analysis was also conducted on bulk ground and unground tailing samples before and after leach extraction tests with simulated gastric fluid. Linear combination fitting of EXAFS data was employed to characterize the arsenic species existing in these mine tailings. Analysis of μXANES data visualized in XRF maps reveals the arsenic species present as encapsulated, homogenous, or surface bound with respect to particle distribution. Insights in these relationships should enable us to produce more comprehensive assessments of short- and long-term potential health hazards and help inform the remediation of arsenic-contaminated environments.

**Biography:** Manuel Vejar is a junior-standing undergraduate student at California State Polytechnic University, Pomona who is studying Geological Sciences with an emphasis in geology. Previously, he studied at Santiago Canyon College and participated in a research experience for undergraduate students in the summer of 2016 at Chapman University, where he continues his research work. His past and present research in environmental geochemistry delves into metal uptake and retention by nanoscale iron oxyhydroxides, and arsenic speciation and spatial distribution in mine tailings and their implications in physical weathering, bioaccessibility, and remediation. His long-term goal is to continue to pursue higher education, advance as an academic and to receive a Ph.D. studying environmental geochemistry or environmental mineralogy. He will be applying to in and out-of-state graduate programs in the coming fall semester of 2018.