
# *Fifteenth Annual*

# *Ronald E. McNair Scholar*

# *Undergraduate Research Symposium*

**Friday, June 6, 2014**

# A Message From the Director

Welcome to the Fifteenth 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 1999, over twenty-five Scholars have completed their doctorates, and more than thirty-five are in Ph.D. programs across the nation.

Dr. Winny Dong

**McNair Scholars Symposium Program**

**Friday, June 6, 2014**

**Kellogg West Conference Center**

**Research Symposium – 9:00 AM – 11:50 AM**

**Schedule of Oral Presentations**

***Mountain Vista #1***

| | |
|---|---|
| 9:00 – 9:15 | Lucas De Buren |
| 9:15 – 9:30 | Jesus Barriga |
| 9:30 – 9:45 | Araz Boghozian |
| 9:45 – 10:00 | Raul Gonzalez |
| ***10:00 – 10:30*** | ***Break*** |
| 10:30 – 10:45 | Jose Mendez |
| 10:45 – 11:00 | Aaron Castellanos |
| 11:00 – 11:15 | Grace Lim |
| 11:15 – 11:30 | Jillian Walker |
| 11:30 – 11:45 | Ana Gonzalez |

***Mountain Vista #2***

| | |
|---|---|
| 9:15 – 9:30 | Gabriela Garza-Vazquez |
| 9:30 – 9:45 | Marlena Lopez |
| 9:45 – 10:00 | Thuan M. Tran |
| ***10:00 – 10:30*** | ***Break*** |
| 10:30 – 10:45 | Nhu Do |
| 10:45 – 11:00 | Daryl Adkins |
| 11:00 – 11:15 | Cynthia McKee |
| 11:15 – 11:30 | Brian Bulaya |
| 11:30 – 11:45 | Dianne Sanchez |

***Campus Vista #3***

| | |
|---|---|
| 9:30 – 9:45 | Jocelyn Murillo |
| 9:45 – 10:00 | Lindsey Davis |
| ***10:00 – 10:30*** | ***Break*** |
| 10:30 – 10:45 | Andrea Lavilles |
| 10:45 – 11:00 | Audrey Paredes |
| 11:00 – 11:15 | Amanda Riggle |
| 11:15 – 11:30 | Julio Pizano |
| 11:30 – 11:45 | Eliza Hernandez |

# Scholar Abstracts and Biographies

MOUNTAIN VISTA #1

**Lucas De Buren**
**Mentor:** Felipe J. Perez, Ph.D., P.E.
**Title:** *Analytical Discrepancies in Fiber Model Analysis of Unbonded Post-tensioned Precast Concrete Walls*
**Abstract:**
This presentation investigates discrepancies in fiber model analyses of unbonded post-tensioned (UPT) precast concrete walls under combined gravity and cyclic lateral loads using the DRAIN-2DX program.
Previous work showed that fiber model analyses of UPT walls with relatively large initial prestress accurately represent the experimental base-shear lateral drift response under monotonic and cyclic lateral loads. It is expected that the base-shear under monotonic loading represent an upper bound to the base-shear lateral load response under cyclic loading. However, for two of these lightly prestressed walls, the analytical base-shear under cyclic loading exceed both the experimental base-shear and the analytical base-shear under monotonic loading. Therefore this research aims to establish a lower bound prestress level for which the fiber model produced acceptable (i.e. No significant overshoot of the monotonic response) base-shear response values of an UPT wall subjected to cyclic lateral loading.

**Biography:**
Lucas is entering his senior year as a Civil Engineering major at Cal Poly Pomona. His current research involves analyzing UPT walls under combined gravity and lateral loads. He plans to attain his Ph.D. in Structural Engineering with an emphasis in seismic design and become a professor at a four-year university as well as own his private consulting firm. He will be applying to graduate schools in the Fall 2014 quarter and hopes to attend Notre Dame University.

**Jesus Barriga**
**Mentor:** Francelina Neto, Ph.D.
**Title:** *P.L.S. Title: Rollercoaster – Energy Transformation*
**Abstract:**
Roller coaster passengers do not realize that as they are "cruising down the track at 60 miles an hour, the ride has no engine" (Annenberg Learner 2013). Roller coasters, however, are conceived and designed to be motor less. Roller coaster designs are based on physical laws that govern them. There are many physical laws, but this study will focus on the law of conservation of energy and energy transformation. The law of conservation of energy states that energy cannot be created nor destroyed. Energy transformation is the process of changing one form of energy into another. As a result, roller coasters transform potential energy into kinetic energy and vice versa. This research focuses on energy transformations in loops and curves by validating certain

equations. The study looks at different size loops as well as both flat and banked curves and compares their respective energies and velocities. This research will provide valuable information to support the physical laws used to design roller coasters and will inform individuals of the function of roller coasters.

**Biography:**
Jesus Barriga is a third year Civil Engineering student at Cal Poly Pomona. His current research involves the validation of equations developed from physical laws of force and energy conservation, as applied to roller coaster design. Jesus plans to pursue a Ph.D. in Civil Engineering with an emphasis in Transportation. He aims to follow a career in academia after gaining field work experience. He will be applying to graduate schools in Fall 2015 and is looking forward to attend the University of Michigan.

**Araz Boghozian**
**Mentor:** Mehrdad Haghi, Ph.D.
**Title:** *Deposition Direction Dependent Failure Criteria for Fused Deposition Modeling ABS*
**Abstract:**
The study explores the dependence of material properties and failure criteria for fused deposition modeling (FDM) Acrylonitrile Butadiene Styrene (ABS) on raster orientation. Compression tests were conducted on a range of cylindrical specimens at raster angles between 0 to 90 degrees in 10 degree increments. Specimens were manufactured with the raster angle held constant during the manufacturing of each specimen. That is, the adjacent layers stayed at the same angle throughout the production of each specimen. The compressive yield strength, the maximum stress before fracture, and Young's modulus were calculated and analyzed for each specimen. The orientation-dependence of properties is to be analyzed and used to generate a failure mechanism map for the material. This study provides valuable experimental data for FDM ABS and provides micro-mechanisms of failure that suggest explanations for angular variation of strength with raster orientation. The analysis methods which have been used for composites seem to be applicable to FDM Polycarbonate, which in fact leads us to expect that the same analysis methods will apply to FDM ABS as well. If this indeed turns out to be the case, this work will provide a powerful tool for determining the service loads that this important class of materials can tolerate.

**Biography:**
Araz transferred from a junior college to California State Polytechnic University, Pomona as a Mechanical Engineering major. Being a recent immigrant, he has overcome different barriers on his way to ensure excellence in his academics. His goal is to obtain his Master's degree in either Mechanical Engineering with Fluids and thermal sciences concentration or Engineering Management. He is passionately interested in working in an aerospace company where design and manufacturing of different airplane parts take place. Araz hopes to graduate in the fall of 2015 and start

his Master studies one year later at either UCLA or USC. He believes that the McNair Scholars Program helped him in several ways to move toward his goals, and he is delighted to be a McNair Scholar.

**Raul Gonzalez**
**Mentor:** Xin Ye, Ph.D.
**Title:** *Android Smartphone Application for Travel Data Collection*
**Abstract:**
Travel data collection refers to the data collected as someone travels and generates a list of trips, destinations, purpose, modes of transportation, company, departure, arrival times, and route choice. Travel data has been used to create a travel demand model which is a useful instrument to create and implement new transportation policies. It has also put into effect to see how current transportation policies affect air quality and to gain a better understanding of how and why people travel. The scope of this study is to explore the development of a cutting-edge travel data collection device by taking advantage of the wide availability of smartphones. An Android smartphone application (app) was developed using Eclipse app development software. This app detects longitudinal and latitudinal coordinates, exact time for those coordinates, and stores them in the internal memory. Once the data is collected, the trips will be plotted onto Google Earth for visualization. Various software programs will be used to convert the text file stored in the phone's memory into a format that can be plotted onto Google Earth. This study focuses on the development of a smartphone application with the addition of a built-in travel survey. The team will ensure that the application is both battery efficient and runs as a background service.

**Biography:**
Is a fourth year civil engineering major with a minor in mathematics. His emphasis is on transportation engineering. Early in his academic carrier he decided to pursue a carrier that involved a great deal of math. This journey has been far from easy but his passion, determination and the McNair Scholars Program have assisted him throughout this journey. Raul's ultimate academic goal is to obtain a Ph.D. in transportation engineering. Raul also hopes to one day inspire young minds to pursue not only a higher education but to seek a degree in science or engineering. Raul's current research projects involve transportation planning and transportation safety. This project in particular involves developing a smartphone application to collect travel data with a built-in travel survey.

**Jose M. Mendez**
**Mentor:** Felipe J. Perez, Ph.D., P.E.
**Title:** *Compressive Behavior of Confined Steel Fiber Reinforced Concrete (CSFRC)*
**Abstract:**
In modern reinforced concrete structures, a large amount of steel reinforcement is required to confine concrete in highly stressed zones. Some of the disadvantages of having this much steel confinement is that placement of concrete can be difficult and voiding can occur, which results in lower performance. The purpose of this research

is to add steel fibers to the concrete mixture, thereby reducing the amount of steel confining reinforcement. Adding steel fibers can result in reduced confining reinforcement by as much as 40%, reduced congestion of steel, reduced risk of voiding, increased concrete strength, and faster and easier construction. The goal of the research is to validate a proposed analytical model on CSFRC with empirical data. In addition, steel fiber reinforced concrete cylinders will be tested with varying amounts of fibers to validate an important parameter for this research.

**Biography:**
Jose is an undergraduate student at California State Polytechnic University, Pomona, where he studies Civil Engineering. He is interested in studying earthquake and structural engineering to improve structural performance of buildings during earthquakes. His ultimate academic goal is to attain his Ph.D. in Structural Engineering and Structural Mechanics. His future goals are to inspire underrepresented and low income students to pursue higher education.

**Aaron Castellanos**
**Mentor:** Gerry Harp, Ph.D.
**Title:** *Multi-epoch Circularized Measurements of the Galactic Center (~6667 MHz) taken from the Allen Telescope Array at the Hat Creek Radio Observatory in 2013*
**Abstract:**
The Allen Telescope Array (ATA) is a 42 radio dish array located in Hat Creek, CA and is used to search for traces of Extraterrestrial Intelligence (SETI) and to study the interstellar medium. The ATA has taken multi-epoch measurements of the Galactic Center (~6667 MHz) and are imaged on 10 second timescales to search for intensity fluctuations on timescales 10s and beyond. This researcher utilized software developed and focused on antenna system temperatures to minimize Radio Frequency Interference (RFI) in order to enhance calibration and signal variability. This researcher will observe potential radio bursts from the Galactic Center, possibly originating from the descent of the gas cloud G2 into the Galactic Center. This is the first opportunity astronomers have had to observe such an astrophysical event of this type, which will shed light on the mysteries surrounding the enormous gravity of black holes.

**Biography**
Aaron Castellanos will be graduating this Spring with a baccalaureate of Science in Electrical Engineering (E.E.) and a minor in Astrophysics. His work experience includes writing and developing Java software for the Hat Creek Radio Observatory in Hat Creek, CA and designing a power distribution for an autonomous robot. He is also currently working for the Jet Propulsion Laboratory (JPL) in Pasadena, CA, where he has contributed to the next generation of Ground Systems modeling and has written telemetry software for an Earth science satellite launching in November 2014. This summer he will conduct research in the Laboratory for Aviation and the Environment (LAE) at the Massachusetts Institute of Technology. In addition, he hopes to receive his doctorate degree in E.E. focused in the field of robotics and control systems. He

hopes to one day develop robots that will be used for planetary exploration in the solar system.

**Grace Lim**
**Mentor:** Randall Swift, Ph.D.
**Title**: *Stochastic Rumors*
**Abstract**:
Rumors have been affecting the dynamics of social systems for centuries. This paper examines the deterministic models and stochastic processes of rumor spread with the assumption of a closed, homogeneous population. The population is divided into three subcategories: ignorants, spreaders, and stiflers. The researcher developed the stochastic process given by a continuous, bivariate Markov chain; and by the backwards and forwards Kolmogorov equations, a system of differential equations of probabilities was obtained. For further insight, the probability generating function is analyzed and solved using a mean approximation method.

First, solutions to the deterministic model were found, considering only the ignorants and spreaders. The researcher then developed the stochastic process and observed that the probability generating function was a partial differential equation where the solution could be expressed as a series of hypergeometric functions. As a result of the complexity, the researcher created an approximation method and realized that the expected values of the approximate process matched the deterministic curve. Furthermore, the epidemic curve of the approximate process was exactly the deterministic epidemic curve. The researcher then built up the general deterministic and stochastic model, which considered all three subpopulations. The researcher solved this system numerically, and analyzed the solutions with different chosen parameters.

The idea of the numerical method arose from the hypergeometric solution of the partial differential equation formed by the probability generating function. Instead of trying to use a class of complex functions for applications, the researcher created a method that led to similar results with less complicated solutions. Future research will apply the same approximation method for the probability generating function of the general stochastic model.

**Biography**:
Grace Lim is an undergraduate at California State Polytechnic University, Pomona where she studies Applied Mathematics and Computer Science. Her current research involves different applications of epidemic modeling. She plans to attain her Ph.D. in Mathematical Biology and pursue a career in medical research. Eventually, she would like to become a professor at a four-year university, while continuing research.

**Jillian Walker**
**Mentor:** Rakesh Mogul, Ph.D.
**Title:** *Proliferation of Spacecraft-Associated Acinetobacter on Ethanol Cleaning Solvents*
**Abstract:**
During spacecraft assembly, the reduction of bioburden is of utmost importance. The study of planetary bodies that may harbor (or may have once harbored) life demands that every precaution is made to protect both the integrity of life detection missions and the study sites in which they are conducted. Cleaning solvents like ethanol are in frequent use in spacecraft assembly facilities, but studies have shown that particular bacteria in the genus *Acinetobacter* can proliferate on ethanol under minimal salt conditions. Therefore, this experiment seeks to characterize the relationship between bacterial growth and ethanol concentration.

*Acinetobacter* are Gram-negative, non-spore forming bacteria which have been isolated in several spacecraft assembly facilities (SAFs). While some strains have been found on the floors of these SAFs, one strain—*A. radioresistens* 50v1, isolated from the surface of the preflight Mars Odyssey orbiter—experienced growth when cultured in media containing ethanol. Metabolism of ethanol is further supported by the proteomic abundance and enzymatic activity of alcohol dehydrogenase in this strain, and data gathered by this researcher suggest that this organism may thrive at lower ethanol concentrations than previously thought. These results suggest that alcohol-based solvents may be utilized as significant fuel sources by the microorganisms in spacecraft assembly facilities both during assembly and during spaceflight. Further research on the ability of *A. radioresistens* 50v1 to metabolize ethanol and similar solvents (like isopropanol) will more clearly identify the risk posed to spaceflight exobiology missions.

**Biography:**
Jillian is a senior at Cal Poly Pomona and is double majoring in Zoology and English Language & Literature. In Fall 2014 she will begin her Ph.D. in Biology at Georgia Tech, and will be studying the evolution of multicellularity using yeast as a model system.

**Ana Gonzalez**
**Mentor:** Felicia Friendly Thomas, Ph.D.
**Title:** *The Effects of Conscious Primes on Implicit Perceptions of Disabilities*
**Abstract:**
It may be argued that the greatest obstacle faced by people who have a disability is prejudice; that it is not overt, or even consciously acknowledged, only serves to worsen the matter. Multiple studies have shown that implicit attitudes toward people with disabilities may be measured using various scales, each with certain merits, applications, and limitations (Pruett & Chan, 2006). Though most of these scales are self-reported values dealing with explicit opinions, some scales such as Greenwald's Implicit Attitude Test (IAT) deal with the unstated biases felt towards people with a disability (Greenwald, McGhee, & Schwartz, 1998). Tests like these are meant to measure subconscious aversions toward certain categories (in this case, a certain group of people) even if these negative tendencies are consciously denied (Vaughn,

Thomas, & Doyle, 2011). The IAT is a useful tool in studying implicit perceptions because the subconscious tendency to associate certain words with specific groups of people may be measured by the amount of time it takes for a person to categorize a word into a certain group, with ease equating rapidity and hesitation signifying a difficulty in connecting the subjects. Differences in measured response time are the source of the IAT scores (Greenwald et al., 1998). The current study will measure the effects of conscious primes, or stimuli, on the inherent beliefs of non-disabled persons towards people who have a disability (whether that disability is physical, mental, learning, etc.) and ascertaining whether these primes produce any changes in the participants' IAT scores measuring implicit bias. The correlation between explicit and implicit attitudes (or lack thereof) will also be measured and explained. It is the researchers' hope that increasing the base of research and knowledge in this subject will lead to great understanding and awareness of disability prejudice.

**Biography:**

Ana is an undergraduate student at Cal Poly Pomona, majoring in Psychology and with a minor in Physiology with an emphasis on Neuroscience. She hopes to obtain a Ph.D. in the field of Neuropsychology and develop novel alternative treatments for various cognitive and physical disorders. Her current research interests focus on disabilities and alternative therapies such as Animal Assisted Therapy, especially therapeutic horseback riding.

**Gabriela Garza-Vazquez**
**Mentor:** Andrew Voss, Ph.D.
**Title:** *Assessing neuromuscular transmission in mice with Huntington's disease*
**Abstract:**
Huntington's disease is a degenerative genetic illness that is characterized by progressive and severe cognitive and motor dysfunction. The motor symptoms include chorea (involuntary movement), dystonia (sustained muscle contractions), rigidity (stiffness), and weakness. These symptoms are typically thought to be caused by neurodegeneration. Recent research at Cal Poly Pomona has shown that there are defects in skeletal muscle in mice with HD. This project is focused on studying the signals sent from the brain to skeletal muscle, which occur at the neuromuscular junction (NMJ). In particular, this project is studying miniature end plate potentials (mEPPs) and evoked end plate potentials (eEPPs). These signals result in the release of acetylcholine packets from the pre synaptic terminal to the post synaptic terminal (causing a small depolarization). An mEPP results from the release of a single vesicle of acetylcholine. An eEPP results from the release of many vesicles of acetylcholine; this is caused by stimulation of the motor neuron. The signals within a muscle fiber are recorded by utilizing two intracellular microelectrodes, and a third isolated microelectrode for nerve stimulation. From this data, the mean number of vesicles released per nerve stimulation can be found; this is known as quantal content. Quantal content is calculated by taking the mean amplitude of eEPPs over the mean amplitude of mEPPs. Thus far in this project, it has been found that in wild type mice the mean amplitude of mEPPs 1.0 ±0.2 mV (n=1049) and the mean amplitude of eEPPs is 1.92 ±0.9 mV (n=763). The mean average of quantal content in wild type mice is 2.06 mV (n=3). By also examining HD mice, the researcher can begin to determine if there are defects in the neuromuscular junction in HD.

**Biography:**
Gabriela is a fourth year Biology student at Cal Poly Pomona. She also has minors in Physiology and Dance. Her research interests utilize electrophysiology and include topics such as medical biology and neuroscience. Upon graduation, Gabriela's intent is to attend a Graduate program. She is passionate about research as well as clinical work, and so this has sparked an interest for her to obtain a dual degree, MD/Ph.D.. Her hopes are to one day run a biological research laboratory as well as work with patients.

**Marlena Lopez**
**Mentors**: A. Kristopher Lappin – PI, Ph.D.; Thomas Marino.
**Title**: *Intraspecific geographic variation of body size and sexual size dimorphism in the Northern Alligator Lizard (Elgaria coerulea)*
**Abstract:**
Natural selection influences the evolution of organismal form and function. One category of natural selection is sexual selection, in which selective forces are imposed

by individuals of the same species. Such selective forces can be driven, for example, by variation among males in the ability to access mates and by female choice. Sexual selection is manifested as sexual dimorphism, gender differences in adult body size and secondary sexual characteristics. This study examines sexual dimorphism in a native California lizard, the Northern Alligator Lizard (*E. coerulea)*. Surprisingly little research has been done examining intraspecific (among populations of a species) or interspecific (among species) variation in sexual dimorphism. Preliminary results indicate that *E. coerulea* has a female-larger pattern of sexual dimorphism in terms of body size, but that males have larger and more robust heads. This is in contrast to its sister taxon, *E. multicarinata*, which exhibits the male-larger sexual dimorphism more typical of lizards. To investigate the evolution of sexual dimorphism in *E. coerulea*, this researcher is examining geographic variation of body size and head shape. The data generated by this analysis will facilitate the testing of biogeographical "rules," such as Rensch's rule and Bergmann's rule. Based on these analyses, this researcher will evaluate hypotheses regarding the forces that produce and maintain sexual dimorphism in natural populations.

**Biography:**
Marlena is an undergraduate at California State Polytechnic University, Pomona, where she is majoring in Zoology and minoring in Spanish. Her current research focus is on geographic variation in body size and sexual dimorphism of the Northern Alligator Lizard. While at Cal Poly, Marlena has developed a passion for Conservation Biology, given the great challenges humanity faces in terms of habitat destruction and loss of biological diversity, as well as the effects of climate change in further facilitating negative human impacts on the Biosphere. She will be applying to graduate schools in the Fall of 2014 to pursue a Ph.D.. Marlena's ultimate goal is to secure a tenure-track university faculty position so that she can continue to do research and have the opportunity to pass her knowledge on to others through teaching.

**Thuan M. Tran**
**Mentor:** Wendy Dixon, Ph.D.
**Title:** *Caffeine can override S-phase checkpoint in Saccharomyces cerevisiae*
**Abstract:**
Cdc7/Dbf4 complex is critical to the DNA replication process in the S-phase of *Saccharomyces cerevisiae*. This complex also appears to respond to genotoxic stress, which initiates the S-phase checkpoint and leads to an arrest in the cell cycle. Many research articles have reported that caffeine can bypass the S-phase checkpoint caused by mutagenic stress in fission yeast. Since many of the effects on the cell cycle are universal, *S. cerevisiae* would likely react in a similar manner as fission yeast to caffeine treatment. In this experiment, the researcher examined whether or not caffeine bypasses the S-phase checkpoint induced by either UV light or hydroxyurea. In the first treatment, groups of budding yeast were exposed to UV light for one second, and the researcher observed their morphologies as well as the number of cells in each phase of the cell cycle for every 15 minutes until 60 minutes after the

initial exposure. Results from the UV light treatment showed an increase in S-phase cells with a peak at the 15-minute time point. This result is consistent with the S-phase checkpoint being induced and delaying the passage through the S-phase. In the second treatment, the researcher will apply 0.1 M hydroxyurea to a group of *S. cerevisiae* for four hours, and then observe the morphologies and number of cells in each phase of the cell cycle. Currently, the researcher is treating *S. cerevisiae* with hydroxyurea to induce the S-phase checkpoint arrest. He expects to observe a high number of cells in the G2/M phase. After this is achieved, he will treat both UV treated and hydroxyurea treated *S. cerevisiae* with caffeine and observe the effect on the cell morphologies. Results will be presented at the McNair Scholars Symposium.

**Biography:**
Thuan started his education at Cypress College and transferred to California State Polytechnic University, Pomona. He is now a senior who will be graduating from Cal Poly Pomona with a BS in Biotechnology in Summer 2015. His research interests include cancer, molecular biology, microbiology, genetics and stem cell biology. Thuan would like to explore the application of genetics and stem cell biology on cancer cell research as well as gene-related disorders such as Down-Syndrome. He would like to earn a Ph.D. in Genetics. His current research focuses on the effect of caffeine on the S-phase checkpoint of *Saccharomyces cerevisiae*.

**Nhu Do**
**Mentor:** Nancy E. Buckley, Ph.D.
**Title:** *The effect of garlic on the modulation of Candida albicans induced tumor necrosis factor-alpha from murine macrophages*
**Abstract:**
Garlic (*Allium sativum*) is noted to exhibit antiparasitic, antibacterial, and antifungal properties, specifically against the yeast *Candida albicans* (*C. albicans*). Contemporarily, one of garlic's uses includes boosting the immune system. The immune system consists of innate and adaptive immunity. Macrophages, phagocytotic cells that engulf pathogens and dead cells, have an important role in the innate immune system. They are major producers of an important pro-inflammatory cytokine known as tumor necrosis factor-alpha (TNF-α), which is released upon the detection of antigens such as *C. albicans.*

Laboratory data indicate that TNF-α production, from J774A.1 murine macrophages, is stimulated in the presence of garlic when the cells are plated at $1.25x10^5$ cells/mL, but that garlic suppresses *C. albicans*-induced TNF-α from these cells. This researcher tested to see whether cell density altered the effect of garlic. Thus, macrophages were seeded at four densities: $0.625x10^5$ cells/mL, $1.25x10^5$ cell/mL, $2.50x10^5$ cells/mL, $5.00x10^5$ cells/mL. The cell's treatment consisted of pyrogen free water (PFW), garlic extract, and heat, which killed *C. albicans* with or without garlic. Observations revealed that *C. albicans* drastically increases production of TNF-α at all cell concentrations. It was also determined that garlic decreases TNF-α secretion induced by *C. albicans* regardless of cell density. These

results prompted investigation of the signaling mechanisms by which garlic suppresses *C. albicans* induced TNF-α, specifically the involvement of the mitogen-activated protein kinases (MAPKs).

MAPKs are involved in the regulation of cellular signaling in response to a wide variety of stimuli such as antigens and cytokines. Regulation of cellular signaling consists of many pathways including the signal-regulated kinases (ERKs), c-Jun amino-terminal kinases (JNKs), and p38. This researcher is also examining the ERK pathway by treating macrophages with the ERK inhibitor PD 98059 followed by the addition of *C. albicans* in the presence or absence of garlic. If garlic acts through ERK, it is expected that inhibition of ERK would result in a TNF-α level comparable to those seen when using *C. albicans* alone.

Investigating garlic's effect and its mechanism on *C. albicans* induced TNF-α production will help develop a better understanding of garlic as an antifungal agent, particularly against a *C. albicans* infection, within the innate immune system.

**Biography:**
Nhu is a transfer student majoring in biotechnology at Cal Poly Pomona. She is currently working in a cellular/molecular lab, investigating the effect of garlic on the immune system. Nhu will graduate in Spring 2015 and plans to apply to graduate school in Fall 2014. The realms of research that she is interested in include genetics, cellular/molecular biology, and biostatistics. Her goal is to obtain a doctorate degree in either genetics/molecular biology or biostatistics and ultimately become a researcher and/or a professor at a community college or small university.

**Daryl Adkins**
**Mentor:** Patricia de Freitas, Ph.D.
**Title:** *Feminization of Migration: English Speaking Caribbean Women, New Found Freedoms and Diasporic Trauma*
**Abstract:**
The purpose of this study is to examine, first of all, the migration patterns of English-speaking Caribbean women from the Caribbean islands to England during and after World War II, and secondly, the impact their departure had on the children and families they left behind. This study looks at the conditions in the islands and opportunities in the so-called "motherland" that facilitated and made emigration possible. Given the expectations of motherhood in the Caribbean, this study explores the extent to which these women broke expectations and complicated notions of motherhood, especially for their children. This study involved ethnographic field notes, interviews and historical literary research.

**Biography:**
Daryl Adkins is a graduating senior, receiving her degree in Gender, Ethnic & Multicultural Studies. She has been a Ronald E. McNair Scholar for the past two years. In 2013 she completed her first McNair project titled "Dancing Bomba: A Diasporic Context for Social Change and Meaning in Los Angeles." This fall 2014 she will be

attending graduate school at Oregon State University on a full scholarship, studying with the Women, Gender & Sexuality Studies master's program.

**Cynthia M. McKee**
**Mentor:** Andrew A. Voss, Ph.D.
**Title:** *Progression of hyperexcitability in skeletal muscle – is Huntington's disease a muscle disorder?*
**Abstract:**
Huntington's disease (HD) is a progressive and ultimately fatal disease with devastating motor and cognitive defects. The symptoms include chorea (irregular jerky movements), dystonia (abnormal tonicity often resulting in irregular positioning of head and limbs), rigidity, and disoriented behavior. Huntington's disease is the result of >40 expanded trinucleotide CAG polyglutamine repeats on exon 1 of the human *HTT* gene that codes for the huntington protein. Traditionally Huntington's disease has been approached as a neurological disorder, with research concentrating on specific sites in the brain known to express *HTT*. To examine the role of skeletal muscle in the disease, this researcher utilized the R6/2 transgenic mouse model, which expresses a mutated human *HTT*. Previous lab results found muscle to be hyperexcitable at the end-state of the disease. This is a result of a decrease in the resting chloride and potassium conductance. The focus of this project is to determine the time course over which the chloride channels (ClC-1) defects develop. As early as 5 weeks of age, which is the earliest time point that motor symptoms have been observed, data show a significant reduction in the ClC-1 conductance in HD (1.65 ± 0.14 mS/uF, n=11 ) compared to wild type (2.27 ± 0.16 mS/uF, n=8) muscle fibers (values shown as mean ± SEM with a P=0.01). Moreover, this researcher observed a relatively parallel relationship between the progressive decrease of ClC-1 function and the development of the motor symptom defects. This progression of ClC-1 degeneration supports the idea that the broader motor symptoms of the disease are at least in part a reflection of muscle defects.

**Biography:**
Cynthia is a third year Nutrition Science major at California State Polytechnic University, Pomona. Her current research efforts are focused in muscle physiology with an emphasis in electrophysiology. Her diverse educational background and research interests have lead her to pursue interdisciplinary Ph.D. encompassing metabolism, physiology, and pharmacology. Ultimately, Cynthia intends to turn her love of research and passion for higher education into a career that will enable her to inspire underrepresented youth to share her excitement for science.

**Brian Bulaya**
**Mentor**: Kyle Brown, Ph.D.
**Title**: *Regenerative Student Community Fellowship Program*
**Abstract:**
The *Regenerative Student Community Fellowship Program (RSCF)* was created by Dr. Kyle Brown, director of the Lyle Center at Cal Poly Pomona, in 2012. It began with six

sustainability fellows who aimed to develop a replicable model for university-primary school partnership. The fellows not only taught in the classrooms, but also empowered the community of Pomona to address environmental and societal challenges. With this new cohort, the focus revolves around project based learning, environment and sustainability, and mentorship.

Now, new Common Core State Standards (CCSS) have been implemented and many schools are slowly adjusting to this new change. The purpose of the study revolves around two main questions: In what ways might CCSS support developmental assets essential for the healthy development of young people as well as the regeneration of communities? What role can environmental education projects (RSCF) play in this process at the primary grade levels? Through this study, we are looking to study the effectiveness of this program by observing the preparedness of the fellows in cultivating engaging curricula and the overall relevance of the Common Core State Standards.

Our study, which is in no way close to being completed, will be a longitudinal study and continue on for a few more years. However, we have been able to extract preliminary trends and patterns that have surfaced from our study. We have seen the elements of ownership, learn by doing philosophy and empowerment be extremely prevalent within the classroom and have seen the fellows exemplify these traits. Hopefully, we can see more trends begin to arise and see how we can best address the needs of the students to be the best that they can be.

**Biography**:
Brian is the oldest of five children having come from two Congolese parents residing in Sacramento, California. Currently, he is pursuing a bachelors of science in Urban and Regional Planning. He will graduate in Spring 2015 and pursue a doctorate within Sustainable Development. He hopes to travel back to the Congo and aid to rebuild its infrastructure and create a new mindset within the continent of Africa. He wants to venture to Africa to study the implications of food deserts on sustainable development. In order for the Congo to be prosperous, land use, sustainable development, and public health concurrently must be addressed. This study is of interest because sustainable design must seek to increase the overall well being and quality of life of a particular community. Sustainable development seeks to increase the quality of the environment, economy, and equity for all individuals. When these factors are achieved, this research and implementation will be successful.

**Dianne Sanchez**
**Mentor:** Yan Liu, Ph.D.
**Title:** *Detecting Levoglucosan by a Gas Chromatography-Mass Spectrometry Method*
**Abstract:**
Wildfires of wood and grass are common during summers in Southern California. During the process of biomass combustion, many organic species are produced. Cellulose is broken down into monosaccharaide anhydrides (MA) such as levoglucosan, mannosan, and galactosan which remain in the atmosphere in their particulate phase and can significantly aggravate air quality. Particles in the

submicron size range can affect Earth's radiation budget by scattering and absorbing solar radiation or by acting as cloud condensation nuclei. A high amount of organic particulate matter can also cause serious health problems. Consequently, it is important to quantify these components in biomass combustion for air quality monitoring. Levoglucosan (LG) is commonly used as a key molecular marker related to biomass combustion due to its source-specific nature and chemical structure stability. This study uses gas chromatography coupled with mass spectrometry to detect levoglucosan.

**Biography:**
Dianne is graduating with her Bachelor of Science in Chemistry in June of 2014. She has been accepted to the University of California, Irvine where she will pursue her Ph.D. in Atmospheric Chemistry through the Department of Earth System Science. Dianne plans to use her doctorate to teach at the university level and continue doing research that will influence environmental policy.

**Jocelyn Murillo**
**Mentor:** Pablo Arreola, Ph.D.
**Title:** *The Sandinista Revolution: Perceptions and Attitudes of Nicaragüense women in Southern California*
**Abstract:**
The purpose of my research is to qualitatively measure the impact of the Nicaraguan Revolution on Nicaraguan women in the immigrant community in the United States. It is well known that women played a major role in the "failed" Sandinista Revolution in Nicaragua (1979-1990) and despite recent political setbacks in Nicaragua, women appear to have been politicized, having gained political and social reforms. I wish to measure this process. The parameters of this study will cover the years of the revolution itself, and the post-revolution to the present, which is approximately 1979-2013. Through analysis of primary and secondary sources, as well as interviews of immigrant Nicaraguan women, I expect to gain an understanding of their general attitudes and perceptions of their revolution in regards to gender equality and education. This research is significant because although the literature on Nicaraguan gender relations is extensive, little to no research has been done on the immigrant community in Southern California which has molded a new community and identity. My research will help in filling the gap in contemporary immigrant history, a subject that has been neglected.

**Biography:**
Jocelyn Murillo is a History undergraduate student at California State Polytechnic University, Pomona. Her research interests lie in revolutions in Latin America and East Asia, specifically women's roles in revolution. She plans to pursue a doctoral degree in Latin American studies and become a professor. As a first-generation college student and a Latina, she aims to promote diversity at the graduate level. In her spare time, Jocelyn studies entomology and owns a Chinese praying mantis.

**Lindsey Davis**
**Mentor**: S. Terri Gomez, Ph.D.
**Title**: *Feeding the Future: Food Sovereignty and Intergenerational Knowledge*
**Abstract**:
Through community based scholarship, this qualitative study illuminates food justice practices by providing an ethnographic case study of a grassroots organization located within an urban area of Southern California whose members derive primarily from within a local lower-income community of color. Two main aspects of the organization will be discussed: a weekly free food program and its associated youth group. This report will discuss the significance for this organization to work outside of the established non-profit framework as it addresses issues of food sovereignty and health. The data collection methods include critical ethnography and participant observation, semi-structured interviews, and a focus group. Data analysis will involve

coding/ bracketing based on themes that arise around food sovereignty, indigenous food practices, and intergenerational knowledge transfer.

The research questions for this study are the following: 1. How are food sovereignty practices in this group overcoming the challenges of access to healthy food for low-income urban residents? 2. How do indigenous or premigratorial food practices and the idea of food as medicine promote health? 3. How is knowledge about healthy food practices passed on to the next generation? The central focus of this project is to explore how food sovereignty and intergenerational knowledge transfer is related to perceptions of health and to provide a model for creative solutions for nutrition access within an urban setting. This work seeks to contribute to the current body of knowledge on the topics of food justice and social movements using Nancy Fraser's theoretical framework of counterpublics.

**Biography:**
Lindsey Davis is an undergraduate student at California State Polytechnic University, Pomona where she is majoring in Gender, Ethnicity, and Multicultural Studies. Lindsey is minoring in Regenerative Studies and will be graduating in the Fall of 2014. One of her goals is to earn a doctorate degree in Ethnic Studies or Gender/Queer Studies and becoming an ethnic and gender studies professor. Lindsey's research interests include the topics of food justice, decolonial epistemologies, and media representation.

**Andrea Lavilles**
**Mentor:** Anthony Ocampo, Ph.D.
**Title:** *Mixed Messages: How Race and Gender Affect How Young Adults Understand Cultural Events*
**Abstract:**
This study examines how race and gender affect how young adults understand racially charged events, drawing on the case of two infamous occurrences involving American youth: Miley Cyrus and Trayvon Martin. This study uses intersectionalist feminist theory to explain the possible differences in how different groups interpret these events. This study aims to add to the existing knowledge of how different social groups create different messages from cultural events and reveal the potential sociological impacts such events may have on its audiences. This researcher conducted in-depth interviews with twenty young adults of various ethnic backgrounds, asking not only their interpretations of these events but also about their personal background. Each interview was then transcribed and subjected to an inductive coding analysis to identify themes involving race and gender. Preliminary findings show that most participants did not believe Miley Cyrus's 2013 VMAs performance to be a racialized event, while most participants did not view the Trayvon Martin incident in terms of gender. In addition to this, the researcher found that women participants were more likely to view both events in terms of gender. Finally, it was discovered that those who have experienced racial discrimination were more likely to view both Cyrus's 2013 VMAs performance as well as the Trayvon Martin/George Zimmerman incident in terms of race.

**Biography:**
Andrea is a fourth year Sociology major at Cal Poly Pomona. Her primary research interests are gender and the media. Andrea is a member of the Kellogg Honors College, a club officer of the Sociology Honor Society Alpha Kappa Delta, and has helped her fellow students navigate the university as a peer mentor in the Psychology and Sociology Department. Andrea will complete her education here at Cal Poly Pomona in the Fall of 2014 and intends to participate in a graduate program in the Fall of 2015.

**Audrey Paredes**
**Mentor:** S. Terri Gomez, Ph.D.
**Title:** *Speaking From the Margins: (Re)Imagining Central American Parental Involvement*
**Abstract:**
Educational Pipeline research shows that Latino/a students are at a disadvantage in the realm of education. Of 100 Latino/a students who attend high school in California, only twelve attend and graduate from a four-year university. This problem exists due to the fact that Latino/a students are not given the proper resources to achieve in academics and because from the moment they start school, they and their families are considered culturally deficient. This belief that students are at a disadvantage has been coined "Cultural Deficit Model." Deficit thinking takes the position that parents do not care nor promote education in their homes. Past research in the field of Latino/a education has proved otherwise. There is significant evidence that parents do value education and pass that value onto their children. However, these works have not adequately addressed how Central Americans become involved in their child's/children education. This study will fill this gap by examining and (re)conceptualizing ways in with Central American parents are involved in their child's/children's educational experiences. The central focus of this study is to highlight ways of involvement that are rendered invisible in comparison to the tradition methods of parental involvement. This study argues that Central American parents do in fact pass on and teach their children particular skillsets that help their child/children succeed in education. In conclusion, this project will shed a new light to the experiences of Central Americans in the United States.

**Biography:**
Audrey Paredes is a fourth year senior at California State Polytechnic University, California majoring in Gender, Ethnicity, and Multicultural Studies with a concentration in Chicana/Latino Studies. She is the daughter of Guatemalan immigrants and the first in her family to attend college. Her main goal is to receive a doctorate in Race and Ethnic Studies in Education and become a professor. Also, she hopes to help fix the educational achievement gap amongst Students of Color and to continue doing research in social justice related topics.

**Amanda Riggle**
**Mentor:** Edward Rocklin, Ph.D.
**Title:** *Integrating Technology into the Performance Model of Teaching Shakespeare*
**Abstract:**
In 2010, President Barack Obama set forth a plan called "Transforming American Education: Learning Powered by Technology," which mandated that technology be integrated into American classrooms to enhance student learning. The need for technology in the classroom is not only government assigned, but also helps improve familiarity with the use of technology in a future job market that is globalized and technology driven. The purpose of this project is to find ways of meeting the 2010 mandated use of technology within a performance-based classroom teaching Shakespeare by creating learning opportunities in which technology can be incorporated into the classroom through student-generated content. Through examining other successful classroom models incorporating technology as well as looking ahead at some proposed, yet still controversial, technology-driven classroom models and finally utilizing performance approaches to teaching Shakespeare within the new Common Core standards being implemented in K-12 schools throughout the nation, this project will create a hybrid of technology and the study of 16th and 17th century plays by Shakespeare that can be successfully implemented in a Common Core classroom.

**Biography:**
Amanda Riggle is an English Education undergraduate at California State Polytechnic University, Pomona. She has a passion for reading, writing, Shakespeare, and teaching. Her passions have already carried her overseas to teach English pronunciation in both China and Taiwan in the summers of 2012 and 2013. In addition, she has been awarded the 2012 Lillian Wild Shakespeare Scholarship for her demonstration of enthusiasm for Shakespeare. Amanda's interest in writing has led her to be the co-editor of ThePoeticsProject.com, a blog dedicated to reading, writing, and literacy. She has also had three poems published in *Pomona Valley Review*, issues seven and eight. In the future, Amanda will pursue her Ph.D. in English and plans to teach and spread her passions for reading, writing, and Shakespeare around the world through her teaching.

**Julio Pizano**
**Mentor:** Rachel Van, Ph.D.
**Title:** *Negotiating Empire and Power in California: The Americanization of Santa Barbara, 1840 to 1880*
**Abstract:**
In 1848, Santa Barbara officially became part of the United States along with the rest of California as part of the treaty negotiations ending the Mexican-American War. Although the treaty made Santa Barbara a part of the nation geographically and politically, it would take more than an act of geopolitics to make California an American space. This paper contends that rethinking "Americanization" as an imperial act converting the foreign into the domestic, rather than territorial

acquisition, is useful for understanding Santa Barbara during the second half of the nineteenth century. Thus, this project examines the experiences of key residents of Santa Barbara from 1840 to 1880, focusing on three arenas: economics, politics, and kinship networks. This research highlights the importance of understanding the process of Americanization as involving competing visions of what kind of American town Santa Barbara should be. As Americans arrived, they challenged existing ideas of markets, law, bureaucracy, and obligation, but they also adapted to existing institutions and power structures. Yankees and Californians alike contributed to producing American Santa Barbara. Thus, Santa Barbara's transformation from Mexican outpost to American town was never simply a redrawing of the map, but a more gradual, contingent reorientation toward the American nation.

**Biography:**
Julio is an undergraduate at California State Polytechnic University, Pomona, where he studies history. His hobbies include reading, film, sculpture, cycling, tennis, and writing jokes with his dog Sox. He plans to pursue a Ph.D. in the history of the American West. His research interests include the nineteenth century United States, history of capitalism, imperialism, kinship, and history of democracy in the United States.

**Eliza Hernandez**
**Mentor:** Erin J. Questad, Ph.D.
**Title:** *Arthropod community response to plant invasion and nitrogen deposition*
**Abstract:**
Insects play key ecological roles by providing regulating services such as pollination and decomposition. Anthropogenic activity threatens the conservation of beneficial insects and may be responsible for the observed decline in insect diversity. Nitrogen deposition, a human-accelerated process, may pose a threat to insect diversity and thus, their valuable services. Increased nitrogen levels have been found to increase insect abundances yet decrease their species richness. Invasive plant species that can take up nitrogen faster than native species may accelerate these changes in the insect community. The primary focus of this project is to determine the effects of nitrogen deposition and plant invasion on the abundance and taxonomic richness of insects and other arthropods in a managed grassland experiment at the South Coast Research and Extension Center in Irvine. This researcher is sampling from ten of the fifteen plots at the South Coast experiment, five of which are homogeneously treated with nitrogen and the other five are not. To sample soil and litter-dwelling arthropods throughout the growing season, each plot contains two pitfall traps, one placed in a patch of native grass, *Stipa pulchra*, and the other in a patch of invasive grass, *Bromus hordeaceus*. Arthropods are being identified at the taxonomic rank, family. This researcher predicted to find greater arthropod abundance but not necessarily diversity among the nitrogen-treated plots and the invasive grass plots. However, preliminary results show that fertilized plots host a greater diversity of arthropod groups while the unfertilized plots host a lower abundance of arthropods.

**Biography:**
Eliza is currently majoring in Biology—Zoology with a minor in Chemistry at Cal Poly Pomona. Her research interests include anthropogenic impacts and their effects on biodiversity and the environment. She plans to earn a Master's degree in Environmental Science.

**Talin Masihimirzakhanian**
**Mentor:** Ryan Szypowski, Ph.D.
**Title:** *Finding the Geodesics of the Path of Light near a Black Hole*
**Abstract:**
Strong gravitational poles of black holes attract light rays causing their intuitive straight path to bend. It is possible for light to orbit a black hole if the black hole's gravitational poles are sufficiently strong. In this project, the geodesics of the path of light near a black hole will be derived. In the initial phase of the project, the geodesic equation between two points on a regular sphere is derived by minimizing the arc length between two points. Euler-Lagrange Differential Equations are used to minimize arc length and express the result in the form of a Nonlinear Second Order Differential Equation. By using the Finite Difference Method and Newton's Method, the Nonlinear Differential Equation is approximated and visualized in Matlab. The geodesic equation in space time is derived from Einstein's Field Equations and the Schwarzschild Metric. The symmetric quality of a Schwarzschild Black Hole allows the four dimensions of space time to be simplified into lower dimensions. The equations are written in the form of four Nonlinear Second Order Ordinary Differential Equations with boundary values. The four ODE equations are turned into nonlinear algebraic equations by the Finite Difference Method. The results of the approximations from Newton's Method are visualized in Matlab in three dimensions.

**Biography:**
Talin is an undergraduate student at California State Polytechnic University, Pomona where she studies Applied Mathematics. She is interested in both Ordinary and Partial Differential Equations and their application to real life problems. Her current research involves approximating Ordinary Differential Equations in order to find the geodesics (or the shortest path) of light near a Schwarzschild Black Hole. Her summer Research project will be at the University of Wisconsin-Stout where she will be analyzing Radial Basis Functions and their applications to different problems. She plans to attain her Ph.D. in Applied Mathematics to further research in this field and become a professor at a four-year university.

**Daryl Painton**
**Mentor:** Brita Olson, Ph.D.
**Title:** *Development of High Speed Single Photon Counting Image Sensor*
**Abstract:** The detectors on CMOS SPAD image sensors have been shown to provide detection performance on par with single high-speed single photon counting devices with significantly reduced size, cost, and power consumption. This allows them to be

integrated to form a highly-miniaturized single chip image sensor. To date efforts have focused on smart pixels, where complex circuitry is integrated in the pixel with the detector. It is believed that some of the innate advantages of these remarkable detectors are lost with this approach, and bringing these circuits out of the pixel in an arrayed format would greatly improve the pixel fill factor and the performance of the image sensor. This research is focused on the development of a highly miniaturized CMOS SPAD image sensor, capable of running with lower power and equal performance through improved circuitry. Specifically, this researcher focused on the design of the design of a time to analog converter, which allows the image sensor to be used for time of flight applications.

**Biography:**
Daryl Painton is an undergraduate at the California State Polytechnic University, Pomona, where he studies Electrical Engineering. In addition, he is skilled in CMOS and Very Large Scale Integrated Circuit design. His career goals are primarily focused on that of public safety, particularly through the aiding of the defense industry in the development of advanced detection technologies. With this motivation, he will be pursuing a doctorate in Electrical Engineering in order to gain a greater understanding of microelectronics design.

# 2013-14 McNair Scholars

**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 Scholar Symposium at UC Berkeley, as well as those who have given generously of their time and expertise.

Dr. J. Michael Ortiz
Dr. Frank Ewers
Mr. Bruce Kennedy
Dr. Ricardo Quintero
Dr. Victoria Bhavsar
Mr. Deandre King
Ms. Mary Claire Gager
Dr. Jawa
Dr. Yan Liu
Mr. Won Choi
Dr. S. Terri Gomez
Dr. Kenneth Lamb
Ms. Jessica Kizer
Ms. Hannah Krebs
Dr. Ericka Dejonghe
Ms. Hannah Lucas
Dr. Georgia Mickey
Mr. Brian Ramirez
Mr. Cristian Aguilar
Dr. Andrew Voss
Mr. Tom Zasadzinski
Dr. Wendy Dixon
Dr. Pablo Arreola
Dr. Felicia F. Thomas

## 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 Postbaccalaureate Achievement Program is named for Dr. Ronald E. McNair, one of those who perished aboard the space shuttle Challenger in 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 and at 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.


Developing Leaders
Through Graduate Education

Program Email Address

mcnair@csupomona.edu

Program Website

www.csupomona.edu/~mcnair