

"Success story of NASA Space Grant CoP program at the Great Basin College."



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National Space Director's Spring Meeting, Arlington, Virginia

3rd March 2017

Introduction - Community of Practice - CoP

- Model to Engage and Retain Minority Students
- Engage community college students with hands on science
- Attract / retain more community college students in STEM fields
- Increase AS degree completion
- College transfer / employment in STEM areas



Statewide Program



CSN
COLLEGE OF
SOUTHERN NEVADA

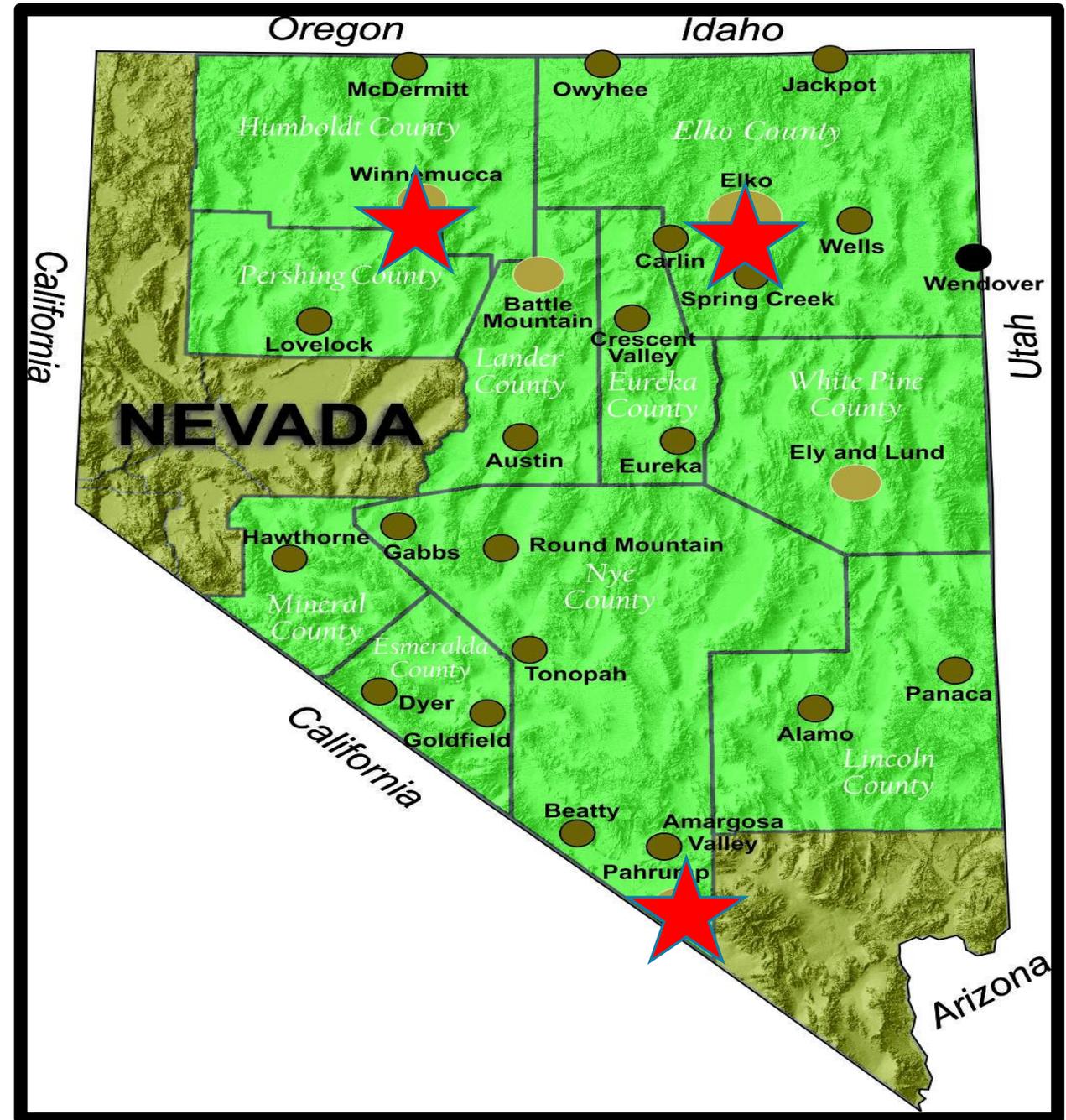


**WESTERN
NEVADA
COLLEGE**



Great Basin College

- Rural
- Great Basin College covers 86,500 square miles
- Two time zones
- Ten of Nevada's largest counties



GBC CoP - How to be a scientist?

- Broad scope of topics

- Number of students – 2 – 7 students/ semester

- Not research based

- End of semester **(3 P's)**
 - 1. Proposal** –Literature based Research proposal
 - 2. Presentation**
 - 3. Poster**

3 P'S - Proposal

- Focused on students area of interest – e.g. - Claytronics, cybernetics
- Literature based
- Discussion
- Review panel

Osteosarcoma: Is PTHrP to Blame ?

Abstract - With the discovery of PTHrP in the late 1980's it is a newer hormone being researched. There is some research being done on other types of cancer related to the PTHrP hormone, but it has not yet been looked at as far as its links to osteosarcomas. With specifically designed research it may very well be possible to finally link PTHrP to osteosarcomas. This research very well could lead to further testing with genetics and the manipulation of the genetics to cure this cancer.

Introduction - There are many types of bone cancer that people can develop but one of the most common types of bone cancer is the osteosarcoma. One must first understand what an osteosarcoma is. An osteosarcoma is when the normal bone cells start to grow out of control. In this cancer, the osteoblasts make a bone matrix that is not as strong as that of the normal bone. Osteosarcomas can further be subdivided into high-grade (spreading the quickest), intermediate-grade, and low-grade (spreading very slowly). Most commonly children and young adults will develop osteosarcomas and they will usually get high-grade osteosarcomas [\(Dentice, M., 2005\)](#). However, one can develop an osteosarcoma at any age it is usually intermediate or low grade. There have also markedly been cases of osteosarcomas after the birth of a child. Osteosarcomas are found in the end of the long bones that are growing quickly such as: distal femur, the proximal tibia, and the proximal humerus [\(Dentice, M., 2005\)](#). The next thing that one must look at is a hormone called PTHrP. PTHrP is an amino-acid protein and has a widespread physiological importance including augmentation of the transportation of calcium and inhibits bone resorption. PTHrP just as importantly regulates endochondral bone development by maintaining the endochondral growth plate [\(Camirand, A., \(2016\)\)](#).

Hypothesis

H1: PTHrP in excess is what is causing osteosarcomas in teens, young adults, and postpartum women.

H0: Excess PTHrP is not related to causing osteosarcomas in teens, young adults, and postpartum women.

H2: Lack of/diminished PTHrP is what is causing osteosarcomas in teens, young adults, and postpartum.

H0: PTHrP plays absolutely no role in the development of osteosarcomas in these groups.

Plan of Research - The use of **isogenic mice** for this research will be imperative as it prevents natural variation (Mouse, 2/17). The mice will first have blood work to get **a baseline of the PTHrP levels.** Once this is done 50 mice will be **given interleukin-2 (amount of 10(-10) M) to naturally increase the PTHrP levels in the mice.** Another 50 mice will be given 1.25(OH)2D3 (calcitriol) 2cc to naturally decrease the PTHrP levels. The last group of 50 will not be given anything and they will be the control group. The testing on the mice will begin when they are in their teenage years for the first round. In the second round, we will start testing when they are in young adult hood. The third round will be in female mice postpartum. This timetable will continue for six months in the teenage years of the mice. At the end of the 6 months the final blood work will be done and mice will be checked for the formation of an osteosarcoma. Running simultaneously with this experiment the young adult mice will also go through the same schedule and testing. The postpartum adult mice will begin testing after the first batch of babies is born and will not be allowed to breed again until testing is done.

Timetable

Day 1: Run blood work on all 150 mice to get a baseline PTHrP for all of them.

Day 2: Inject 50 mice with 1.25(OH)2D3 concentration 10(-10) M. Inject 50 mice with 2cc interleukin-2. Leave the last 50 mice for a control group.

Day 3: Mice will be monitored

Day 4: Blood work will again be done to test the PTHrP levels in all mice.

Day 5: The same 50 mice will again be injected with the 1.25(OH)2D3 10(-10) M solution. The same mice will be injected again with 2cc interleukin-2. The control group will not be injected.

Day 6: Mice will be monitored.

Day 7: Blood work will again be obtained to measure the PTHrP levels in all the mice.

Methods - The methods that will be used for this experiment will be getting baseline bloodwork of the PTHrP hormone in all isogenic mice. One group of mice will be injected with interleukin-2 (2cc), one group will be injected with 1.25(OH)2D3 (10(-10)) M. The third group will just be monitored as the control group. The testing for this will last 6 months with each group. There will be testing done at different ages of mice including young mice, mice when they are in the young adult years, and mice that are post-partum.

Results - Hypothetical results would show that an excess of the PTHrP hormone was causing osteosarcomas in the three groups consisting of teenagers, young adults, and in postpartum women.

Plan of sharing —I would present the results at medical conferences. I would also have the results published in journals including Journal of the **American Medical Association** and the **Journal of Cancer**. **Undergraduates** will be trained in testing procedures and in data collection. The research will be done in conjunction **with the University of Reno in their laboratory**. This would be aided by an endocrinologist and an oncologist.

Future direction - Once it is found that osteosarcoma is caused by excess PTHrP then the next step would be to begin genetic testing to identify why genetically the body is producing too much PTHrP. Once the genetic testing was done then a test should be developed to test preteens for excess PTHrP. Once these steps have been taken then the next step should be to figure out if there was a way to manipulate the genes that are triggering the excess PTHrP hormone.

Conclusion - The link between osteosarcoma and PTHrP hormone may be a reality. The use of isogenic mice will alleviate natural variation and allow them to be tested to see if the PTHrP hormone in excess levels is causing osteosarcomas. This testing will also allow us to see if diminished or nonexistent PTHrP levels are causing osteosarcomas. Once the testing is done we should be able to show that there is either a definite connection between the osteosarcoma or that there is absolutely no connection between the two. Once the testing is done it will allow us to move on to further testing. The testing will also allow us to be able to share our research and its results with other medical personnel who will find the information important. This research could move finding a cure for this cancer closer than we have ever been.

3 P'S - Presentation

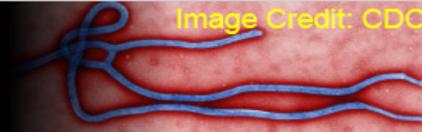
- GBC
- Peer reviewed research paper – Area of interest
- Current topic – Noble prize, Measles, Ebola
- TED talk
- Final presentations- Public -GBC
- State meetings

3 P's – Poster



Ebola: Containing an Epidemic

Award Number: NNX14AQ94A



Kelly Kleeb | Mentors: Jinho Jung and Rita Bagwee, Ph.D | GBC |

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Introduction

The 2014 Ebola outbreak is the largest that the world has ever seen. How do we contain an epidemic of this size and severity? The tried and true methods for containment need to be applied differently for an effective response to a crisis of this magnitude.

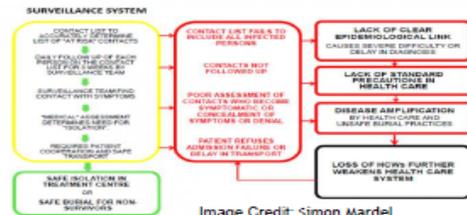
Abstract

The rapid spread of Ebola through Western Africa is one of the worst global health crises that we have faced in recent years. The continued presence of Ebola is a threat to global health security, and the longer the disease persists, the higher the likelihood that it will become endemic. Strong measures must be taken to prevent Ebola from taking root in Western Africa. Over the course of the semester using literature sources, the spread and containment of Ebola was examined. Using diagrams, roadmap reports from the World Health Organization and other information, it was determined that the spread of the Ebola Virus Disease was due in major part to communication challenges, lack of health care workers and poor quality of care. The conclusion of this research is that the current containment plan fails to adequately engage the community and does not use the resources available within the country. For example, local doctors and nurses are generally not being included in the effort because they are not trained and prepared. However, with some effort from international workers, they could easily be trained and provided with proper equipment which would boost the number of health care workers. In conclusion, rather than focus on all the things that they do not have available to them aid workers need to reorganize and focus their efforts. They must mobilize others to supplement their numbers and improve local cooperation which will remove many obstacles on the path to containing Ebola.

Research and Goals

- Determine why the current response is not effective.
- Come up with practical fixes to the areas of breakdown in the current containment strategies.
- Ultimately wipe Ebola Virus Disease out of Western Africa.

Current Containment system



What Needs to Change

- The International Community must have a response plan for Global Health Crises. The responsibility for this undertaking would fall to the World Health Organization (WHO).
- Balanced effort- use all containment strategies equally.
- The foundation of all plans must be community involvement through trusted senior community leaders. (Priests, Shaman, etc.)
- Introduce anthropologists into response teams to promote cultural understanding between health workers and community.
- Have one agency over the entire outbreak for the sake of structure and accountability. This organization should be the WHO, as they are best equipped to handle the responsibility.
- Divide labor into specific groups, like in a cooperation with different departments. Have these groups work in tandem and report to the central authority, the WHO.

Division of Labor

- Division of labor among containment staff.

Hospital Staff

Field Work

Information

- | | | |
|-------------------|-----------------|------------------------|
| - Training | Burial | Community Engagement |
| - Case Management | Case Finding | Social Mobilization |
| - Lab Work | Contact Tracing | Information Management |

Duties of Each Group

- **Hospital Staff**- Trains locals for extra hospital help and manages known cases of Ebola. The hospital staff would also provide the lab work for diagnoses.
- **Field Work**- Provides safe and dignified burial for those who do not survive the disease. They also find new cases based on contact lists of known patients and trace those individuals to find those new cases. Anthropologists would be a member of this team under reviewed containment strategies.
- **Information**- An efficient information team is key to the successful containment of Ebola. All containment methods being with the cooperation of locals, which means that being able to spread information through trusted sources is foundational.

Miscellaneous Needs

- Due to the communication problems in developing countries teams must be decentralized and self sufficient.
- Hospitals must be able to triage their patients and keep those who are most sick in separate areas. Also needed are the involvement and training of local medical staff to provide long term care.
- Rebuild Health Care Systems of affected countries. For the benefit of patients with other illnesses- including Malaria, Tuberculosis, and HIV/AIDS- health care systems need international funding to rebuild and improve.
- Continued research into treatments, vaccines and tests for the Ebola Virus Disease must continue to prevent future health care crises.
- WHO needs to create an emergency fund to deal with global health issues.
- Containment of Ebola must be better organized so everyone remains efficient.
- Information and connection to local populations must be first priority in treating Ebola epidemics.

Conclusion

- In order to successfully eradicate Ebola in Western Africa we need to change how we approach containment.
- With out aggressive containment Ebola could become endemic to Western Africa and a potential global health threat.
- The WHO needs to be better equipped to respond to global health emergencies.

Works Cited

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Pfeiffer, Sacha, and Lynn Jolicœur. "Ebola Causing Collapse Of The Health Care System In West Africa, Boston Doctor Says." Ebola Causing Collapse Of The Health Care System In West Africa Boston Doctor Says RSS 20. American Public Media, 26 Sept. 2014. Web. 17 Apr. 2015. Website

Wideman, Tara. "Brief General History of Ebola." Brief Ebola General History. Stanford University, 1999. Web. 17 Apr. 2015. Website

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Kelly Kleeb

Projects completed till now

Spring 2015

- A. Marisela Ramirez – “Measles Prevention”
- B. Kelly Kleeb – “Ebola containing an epidemic”

Fall 2015

- A. Hannah Mason – “Theoretical applications for travelling faster than light”
- B. Patrick Wick – “Artificial intelligence virtual Avatar ”
- C. Fabian Gonzalez – ‘Unmanned aerial vehicle efficiency in America”
- D. Bryce Powell – “Wave pattern on mars “
- E. Thomas Stafford- “Desalination: A tool for Survival”
- F. Emilee O’Neal – ‘Cleaning space debris”
- G. Colin Mclean – “Material to be used in space”

Spring 2016

- A. Thomas Strafford – “Surveying the unknown: Colonies within Lava tubes can work”
- B. Amanda Murray – “Cybernetics: neural implants”
- C. Patrick Wick – “Home Automated Security Avatar (HASA)”
- D. Shaun Richard – “Quantum Entanglement”

Fall 2016

- A. Amanda Murray - “Claytronics- Programmable Matter”
- B. Smokey Chrisman – “Nanotubes for orthopedic internal implants”
- C. Michelle Milam – “Cheat grass – Alien from Asia”

Spring 2016 (In progress)

- A. Smokey Chrisman – “Osteosarcoma: Is PTHrP (Parathyroid hormone related protein) to Blame?”
- B. Michelle Milam – “Invasive species – Trout ?”
- C. Everett Staley – “Flywheel application”

Challenges for GBC

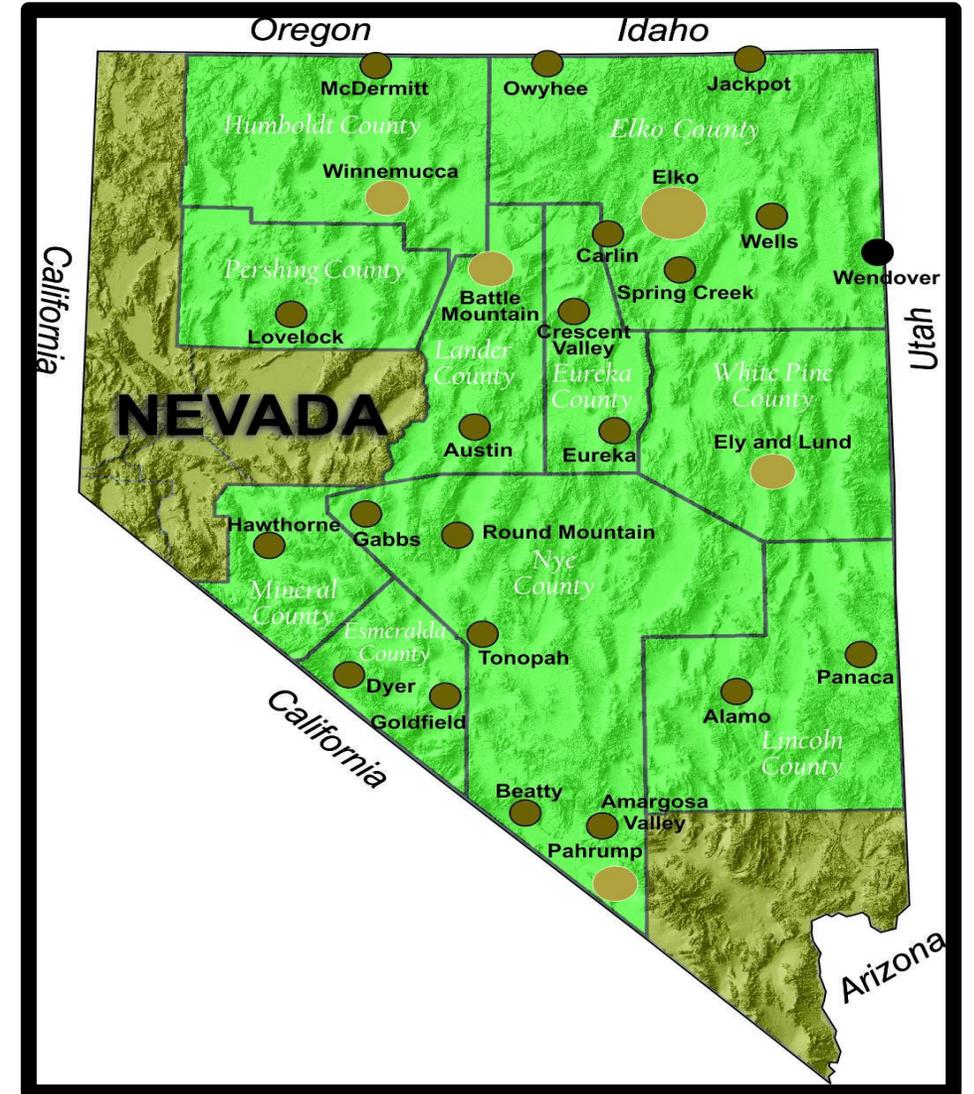
- Different location

Recruiting students

- Non-traditional student schedules
- Associate of science
- Rural – Nursing, Trade school

Lack of Infrastructure

- No dedicated lab space
- Long term support for equipment and supplies



Challenges for GBC

Tracking Program Alumni

Involving more faculty

- Research program of their interest
- Release time unavailable

Benefits

- 19 Scholarships - \$2000 each
- NASA conferences
- State meetings – Reno, Las Vegas
- Nevada Society of professional Engineers
- Blue bucket challenge

Blue Bucket Challenge



- Science Saturday
- GEAR UP - “ Gaining Early Awareness and Readiness for Undergraduate Programs” - Elko, Pahrump
- Girl Scout – Science Badge

David E. James, PhD. PE F.NSPE

Director, Solar and Renewable Energy Programs

Associate Professor -UNLV

Department of Civil and Environmental Engineering and Construction

State Meetings

- IAV – TMCC, WNC, CSN, GBC
- Faculty and students from all the community colleges in Nevada
- Monthly interactive video conference meetings
- Speakers – Research faculty, workshops, NSHE

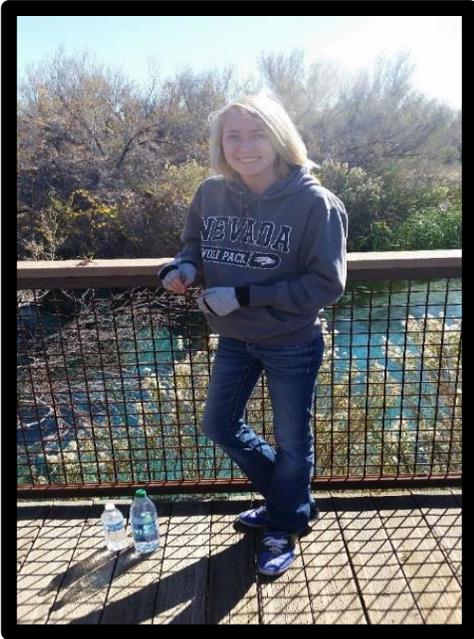


Success story – 1 – Smokey Chrisman



- Carbon Nanotubes for Orthopedic - Internal Implants – **Fall 2016**
- PTHrP hormone and its links to an osteosarcoma – **Spring 2017**
- Huntsman and work on cancer research there for the summer - Salt Lake City, Utah
- Research - Medicine

Success Story – 2 – Hannah Mason



- Transferred to the University of Nevada, Reno
- Pursuing a degree in both Physics and Engineering Physics
- Working in the Electrical and Biomedical Engineering department
- Volunteering as a research assistant in a physics lab in search of dark matter
- NASA – Scientist

Success Story – 3 - Thomas Stafford



- Fall 2015 & Spring 2016
- NFS Title: “The Benefits of Engineering Passive Solar Buildings”
- Academic Year 2016-2017 NSF UROP (Upper Division)
- Bachelor's in Applied Science in Management in Technology in December

Overall Conclusion

- Successfully completed the Co P program
- Worked together
- GBC – 19 scholarships – 14 students – 7 female - \$2000
- Educational supplies

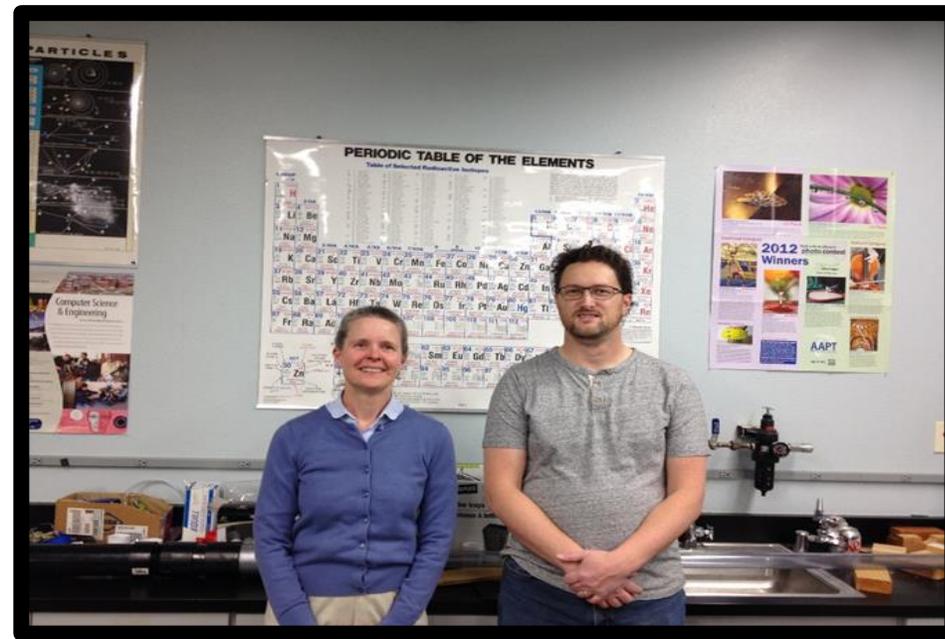
Co P – Partners



Stephanie Fiorenza
CSN



Laura Briggs
TMCC

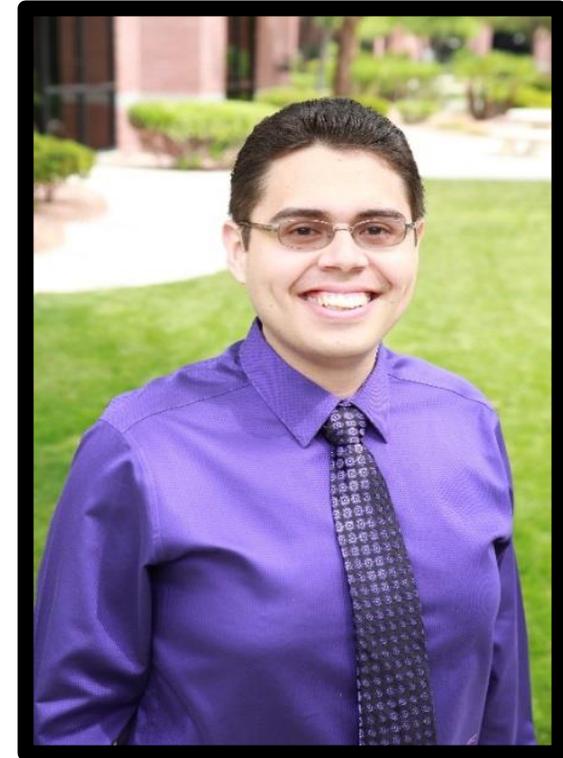


Elizabeth Tattersall & Tom Herring
WNC

Nevada NASA Space Grant Consortium & NASA EPSCoR



Dr. Lynn Fenstermaker
Nevada NASA EPSCoR and Space Grant Director



Gibran Chavez-Gudino
Research Administrator

QUESTIONS ?

