Continuing mentorship of underrepresented students in planetary science through the educational internship in physical science (EIPS)

S. Pon\(^1\), D. De Los Santos\(^2\), G. Alvarez-Rodriguez\(^3\), F. Enriquez\(^4\), S. Terrazas\(^5\), S. Terrazas\(^1\), J. Ricketts\(^1\), J.G. Olgin\(^1,2,3\)

\(^1\)University of Texas at El Paso – Geological Sciences (500 University, El Paso, TX 79968), \(^2\)El Paso Community College – Physics Department (9570 Gateway N. Blvd, El Paso, TX 79924)

Abstract

The number of underrepresented minorities pursuing STEM fields, specifically in the sciences, has declined in recent times [1]. In response, EIPS provides a mentoring environment so that students can actively engage in science projects with professionals in their field so as to gain the maximum benefits in an academic setting. Assigned research projects and creating laboratories related to their research for introductory physics and astronomy classes allowed for building new skill sets. Interns harness and build on what they have learned through the program, and directly apply it in an academic environment in EPCC classes on solar system astronomy. Since the majority of interns are transfer students or alums from EPCC, they give a unique perspective and dimension of interaction; giving them an opportunity to personally gain the maximum benefit when teaching science.

EIPS Semester Curriculum

Module 1: Research Topic

Interns focused on a specific research topic in planetary science, conducted background research, and pursued further investigations through basic computer modeling and image processing techniques.

Module 2: Oral presentations

Interns introduced their research topics and taught them to EPCC students that highlighted and enhanced class curriculum in solar system astronomy.

Module 3: Laboratory Preparation, Geophysical Tour and Delivery

Intervened a laboratory assignment they created from scratch and, based on their research, teach it to students in an astronomy class at EPCC. Also their research will be incorporated into a geophysical tour they will give of the Sacramento Mountains (fig 7) in New Mexico, and related the terrain and tectonic history to that found similarly on other planetary bodies (e.g. Mars).

Sarah Michelle Pon

I am a senior at The University of Texas at El Paso, studying Geology Sciences. I am excited to bring ideas and concepts of geology and planetary sciences to students. Whether it be students who are pursuing a career in the sciences or students just fulfilling their requirements. My goal with EIPS is to engage all students and get them asking questions and help them search for the answers.

For this internship, I have written a lab as an introduction to remote sensing. I give a quick overview of what remote sensing is, how it is applied to everything from Earth science to planets. I also talk about the history of how it was used for Earth science and how it is used for remote sensing for the sky. For this lab, students will use Google Earth and locate different landmarks. Next, we go into the QGIS lab where I go into more depth on the idea behind satellite bands and how we can use them as tools to identify specific details about the land, water, or temperature of an observed area. Also, since this section is a lab, I introduce to the students the image processing and work on it with them also as an introduction to other planetary bodies, like the moon, selenoids, and Mars.

My current project for EIPS 2018 is a continuation of the Fall 2017 project: Remote sensing and using band combinations to identify different geological characteristics and details of the obtained images. Techniques from Fall 2017 are being applied now to planetary targets. Thus providing a blueprint for observations on Mars. In order to be successful, the terrestrial data and techniques needed to be a close parallel to those used on Mars. Data sets of the Pooma Issue Field and just outside of Las Cruces, New Mexico were used as the Mars analogue. The targeted locations on Mars are Gale Crater, Aramithus Trough, as well as an eight-minute return flight from the Jezero Crater.

Deandra De Los Santos

I am a senior at the University of Texas at El Paso (UTEP) majoring in Geology Sciences and will graduate May, 2018. Flushing my mind with UTEP, I have presented on soil slopes and their possible entrainment methods at the Geological Society of America meeting. I also assisted Ekwuma Dyer-Priest, a SUNY Binghamton University PhD candidate, with her research on boundaries between Eocene rock types exposed in the shallower and deeper lake areas of the Panunian basin in Rifas, Colorado, this past summer. I am now conducting research in the Education Internship in the Physical Sciences. My research focuses on the identification of surface hydrology in the Rio Grande RIF using the Quantum Geographic Information System (QGIS) and LANDSAT 8 satellite images.

Remote sensing provides information on the location, range, and changes to surface hydrology over time. It has found similarly on other planetary bodies (e.g. Mars) and used to distinguish between different materials. A similar analysis can be used on Mars due to the presence of water, which is a life-sustaining factor. In this phase of the research, image products were identified and overlaid with land and water, and d) shortwave infrared. Band 5 6 4; D. Natural with Atmosphere Removal; Band 7 5 3

Sophia Terrazas

I graduated from the University of Texas at El Paso with a B.S. in Geology and a Minor in Biology. I am currently working at UTEP Geology Department as a research assistant. I have taught a laboratory exercise based on this.

Guadalupe Alvarez Rodriguez

I am Guadalupe Alvarez, a junior majoring in Environmental Science with a concentration in Hydrology. Over the last year I have been doing research understanding hydrologic dynamics through satellite data.

I intend to give students from diverse backgrounds an insight on how to do research in the Earth’s Sciences through a laboratory in a laboratory where they can work with a small model simulating a research area. Since my work is mainly programming, the laboratory will teach students how through programming we can understand complex natural features that in a large scale can affect populations.

Computer programming is applied in many scientific field and it is not limited to a specific topic. I believe I can encourage students to join STEM fields by showing them the small world hydrology models, that things are not as hard to do when they understand how to work with data. I hope to gain teaching experience, specially to let know how to approach people with all sorts of academic backgrounds when teaching science.

Guadalupe Alvarez Rodriguez’s research is a senior project under the guidance of her geology advisor Hugo Gutierrez at the UTEP Geology Science department. She will teach a laboratory exercise based on this.

Frankie Enriquez

I am an Undergraduate Imaging Scientist and conducted basic digital image processing using HAPI to analyze photos of Wright Mons, a geologic feature on Mars. I also conducted a lab with my colleagues Sophia Terrazas, teaching community college students about cryovolcanism. I have also been conducting research with NASA Goddard Space Flight Center. As a Future Scholar with NASA’s SMD, I am working on lab projects targeting at risk middle and high school students to help introduce them to Earth Sciences. I also won an international drone competition accompanied by colleagues with the University of Texas at El Paso. I have also interned with NASA as an Aerospace Scholar and was stationed in Maryland (APL) and at Arizona State University (ASU) on remote sensing. I intend to give students from diverse backgrounds an insight on how to do research in the Earth’s Sciences through a laboratory in a laboratory where they can work with a small model simulating a research area. Since my work is mainly programming, the laboratory will teach students how through programming we can understand complex natural features that in a large scale can affect populations.

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Future Progress

Furthermore, the Spring and Fall 2018 will include networking activities with planetary science professionals, specifically researchers from the Applied Research Labs in Maryland (APL) and at Arizona State University (ASU) on Pluto and Mars respectively to further enhance interns’ experience. Future work will increase collaborations with student organizations at UTEP, such as the university’s aerial systems club (UAS Club) and the Student Applications of Technology in Science club (SATs) who engage students in interdisciplinary projects related to their field of study. EIPS will also activate people to work at national laboratories and agencies to further their experience, such as with NASA, the Lunar Planetary Institute (LPI), and the United States Geological Survey (USGS), and assist them to further their goals through various academic pathways. Work presented here will also be incorporated in an astronomy course (in development) based on open education resources (OER) at EPCC for the Fall 2017/Spring 2018 semester.

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References: