



Diné College School of STEM

NEWSLETTER



What's Inside:

- Deans Message
- Student Highlight
- Faculty Highlight
- Student Research
- Conferences
- Campuses and Centers
- Internships
- STEM Social

9million

IN STEM EMPLOYMENT GROWTH
BETWEEN 2012 TO 2022.

source: Bureau of Labor Statistics

UPCOMING EVENTS



CLUBS

- OCTOBER: ANIMAL CLUB
- EVERY WED: GREEN CLUB
- OCTOBER: AISES
- OCTOBER: AIHEC



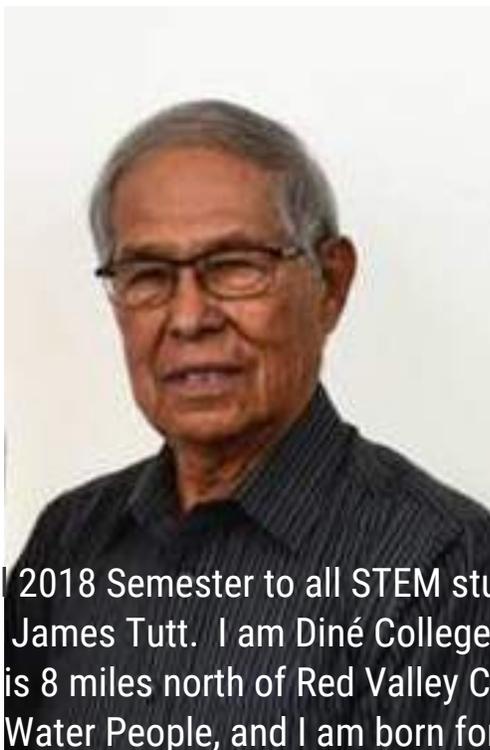
SPEAKERS/WEBINARS

OCTOBER 9: Webinar meeting in GCB 110 from 12-1:15



SCIENCE CONFERENCE

OCTOBER 3-5: AISES, OKLAHOMA CITY, OK
FEBRUARY 21-23, 2019 WASHINGTON, DC



James Tutt

School Dean of STEM

Welcome to Diné College, Fall 2018 Semester to all STEM students, and **Welcome Back** to returning students. My name is James Tutt. I am Diné College **School Dean of STEM**. I am from Oak Spring, Arizona, which is 8 miles north of Red Valley Chapter House. I am Táchii'nii clan, Red Running Into the Water People, and I am born for Áshiihí clan, Salt People.

What is STEM? The way I look at it, it is everything we deal with on a daily basis. The areas we deal with are Science, Technology, Engineering, and Mathematics. **Science**, we see it every day all around us. **Technology** is what really impacts us in the way we live. Old phones that we use to have versus smartphones, which can make our lives better sometimes. **Engineering** is where we see improvement of roads, buildings, bridges, around us every day. We ride on the roads. We drive on top and under bridges. **Mathematics**, we use it in our daily lives in terms of computing, going to the bank or grocery stores. With all four areas, we need to take this, think about it, how it will change our lives.

Study hard to see end results to help ourselves, family, and Navajo Nation. I wish you well during the remainder of the semester.

-- James Tutt

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MATH

SHIPROCK
NORTH
CAMPUS

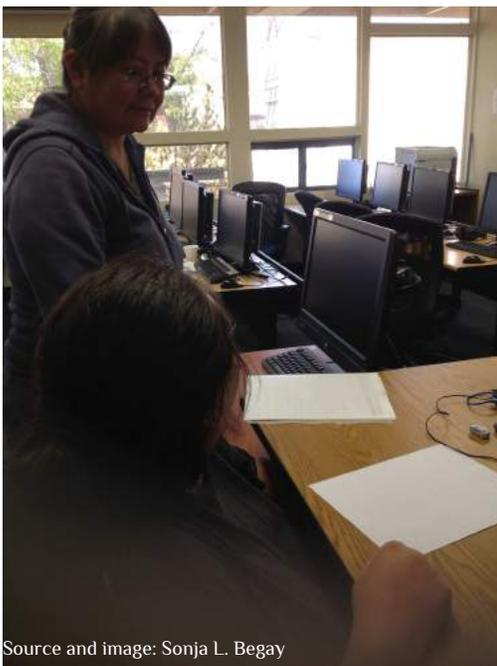
TUTORS



Source and image: Roberta Iyua

Ya'at'eeh! Hello! My name is Roberta Iyua. I am Tsi'naajinii-Shash dine'e (Black Streak Wood-Bear Clan), born for Kinlichii'nii (Red House Clan), maternal grandfather are Naakai (Mexican), and paternal grandfather are Tachii'nii (Red Running Into the Water Clan). I am born and raised in Shiprock, NM, well more like raised in a small community called Gad'ii'ahi, which is located along the west side of the San Juan River. I currently live in Kirtland, NM, which is located 20 mi east of Shiprock, with my family (support team) whom are: my husband, our 8yr old son and 3 dogs- Ashlee, Shadow, and Theo. My son and I commute daily to Shiprock for school and work.

I am currently working on my A.S. Mathematics (major 1), A.A. Social and Behavioral Science (major 2), and A.S. General Science (major 3). Yes, I'm pursuing 3 Associates degrees. My short-term goal is to complete my A.S. Mathematics and this semester with passing grades. My long-term goal is to continue my journey in my education by completing the B.S. Secondary Education Mathematics, because I feel there is a need for more teachers especially in the secondary education fields on the Navajo Reservation. My hobbies are knitting, a pinch of crocheting, beading (I don't mean fighting, ha ha), crafting with my son (especially if he wants to do projects for school), and being with my family. Currently I am working at Shiprock North Campus in the Math Lab. I am assisting Professional Math Tutor, Nicholas Begaye, and Peer Math Tutor, Ervin Chee, with tutoring students in math and science courses. We are currently working on putting together some group sessions of tutoring with students from the MTH100 and MTH110 classes to help them better understand math concepts. We are also working on ideas for some workshops. We (tutors) get together every week to collaborate and to exchange ideas on how we can become successful tutors, overcoming challenges, and supporting one another as a team. I have worked with Dine' College for two semesters as a Peer Math Tutor to gain some experience working with students in lower mathematics classes in understanding concepts and becoming independent learners. This is my second term as a student intern with Great Lakes Project Success and it's a great experience so far. ---Roberta Iyua



Source and image: Sonja L. Begay

Tutor Schedule

Roberta Iyua
 Wednesdays 1pm-4pm
 Thursday 10am-4pm
 Friday 10am-4pm

Nicholas J. Begaye
 M - F 8am-5pm

Ervin Chee
 Monday 11am-8pm
 Wednesday 2pm-8pm
 Thursday 2pm-8pm



OLEKSANDR MAKEYEV

TSAILE MATHEMATICS FACULTY
PH.D., Clarkson University

Solving the general inter-ring distances optimization problem for concentric ring electrodes to improve Laplacian estimation

Abstract

Background: Superiority of noninvasive tripolar concentric ring electrodes over conventional disc electrodes in accuracy of surface Laplacian estimation has been demonstrated in a range of electrophysiological measurement applications. Recently, a general approach to Laplacian estimation for an $(n + 1)$ -polar electrode with n rings using the $(4n + 1)$ -point method has been proposed and used to introduce novel multipolar and variable inter-ring distances electrode configurations. While only linearly increasing and linearly decreasing inter-ring distances have been considered previously, this paper defines and solves the general inter-ring distances optimization problem for the $(4n + 1)$ -point method.

Results: General inter-ring distances optimization problem is solved for tripolar ($n = 2$) and quadripolar ($n = 3$) concentric ring electrode configurations through minimizing the truncation error of Laplacian estimation. For tripolar configuration with middle ring radius αr and outer ring radius r the optimal range of values for α was determined to be $0 < \alpha \leq 0.22$ while for quadripolar configuration with an additional middle ring with radius βr the optimal range of values for α and β was determined by inequalities $0 < \alpha < \beta < 1$ and $\alpha\beta \leq 0.21$. Finite element method modeling and full factorial analysis of variance were used to confirm statistical significance of Laplacian estimation accuracy improvement due to optimization of inter-ring distances ($p < 0.0001$).

Conclusions: Obtained results suggest the potential of using optimization of inter-ring distances to improve the accuracy of surface Laplacian estimation via concentric ring electrodes. Identical approach can be applied to solving corresponding inter-ring distances optimization problems for electrode configurations with higher numbers of concentric rings. Solutions of the proposed inter-ring distances optimization problem define the class of the optimized inter-ring distances electrode designs. These designs may result in improved noninvasive sensors for measurement systems that use concentric ring electrodes to acquire electrical signals such as from the brain, intestines, heart or uterus for diagnostic purposes.

Keywords: Electrophysiology, Electroencephalography, Wearable sensors, Concentric ring electrodes, Laplacian, Optimization, Inter-ring distances, Finite element method, Modeling Open Access ©

Source:

Oleksandr Makeyev

See more of Dr. Oleksandr Makeyev Research at [BioMedical Engineering OnLine](#)

News from Faculty

Introducing the School of STEM faculty team. We have faculty who deals with nanoparticles for water treatment, water measurement on Sand Island, and Laplacian estimation. Here is a quick preview of a couple of Abstracts, starting with Dr. Oleksandr Makeyev.



MICHAEL BEGAYE

SHIPROCK SCIENCE FACULTY
Ph.D., New Mexico Tech



The Synthesis of a Plasmonic Photocatalyst Using Gold Nanoparticles for Environmental application

ABSTRACT

Photocatalysis is the new technology that is being used in research to investigate environmental, energy and medical health issues facing our society. It has been shown that nanoparticles made from gold and silver have the potential to form a plasmonic surface when irradiated by UV or visible light. This plasmonic surface produces an intense electric field which causes a separation of charge on the surface as it oscillates called the plasmonic frequency. This electronic oscillation causes an increase in kinetic and electrostatic energy of the system capable of breaking carbon-carbon bonds in organic molecules through a charge-transfer system. Similar to the excitation of electrons in organic compounds using UV-light.

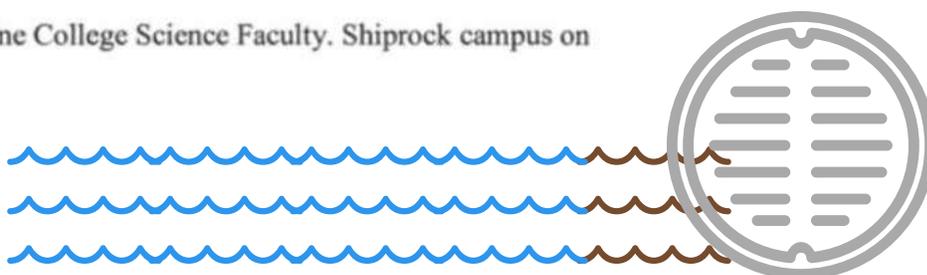
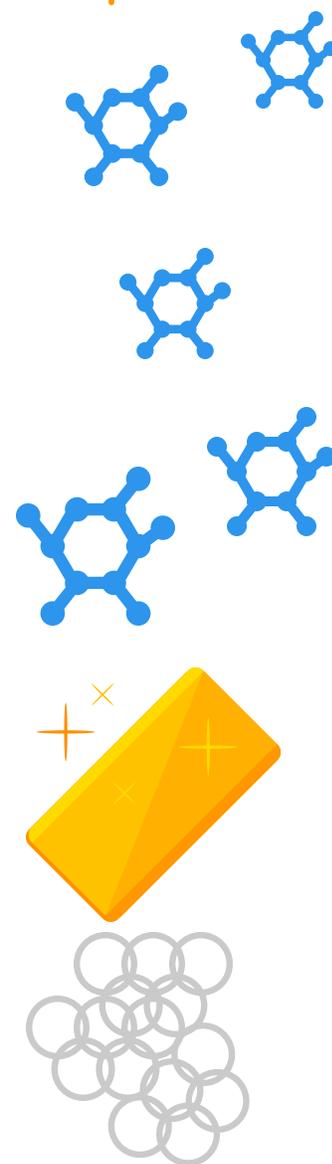
To test our hypothesis, we synthesized spherical and rod shaped nanoparticles sandwiched between a layer of silicon polymer surfactant (cetyltrimethylammonium bromide, CTAB) as the template for the growth of the nanospheres and as a stabilizer against aggregation of the particle in solution. Silver nitrate was added to the solution and made basic using NH_4OH . Auric acid ($HAuCl_4$) was used as our gold source which was reduced to solid gold using sodium borohydride ($NaBH_4$) and ascorbic acid ($Au^{+3} \rightarrow Au^0$)

We choose the the indicator methylene blue for use in our degradation experiment. Spectroscopic analysis and color change (clear solution) confirmed our hypothesis that it is possible to break down a complicated organic compound using visible light with this method. However, further experimentation using this technique must be address to confirm that carbon-carbon bonds could be broken down in toxic organic compounds such as medicines, insecticides, herbicides and pesticides that pollute our river and streams in our society.

The main theme of our research was to develop a technique that could degrade toxic organic compounds in waste water at water treatment plants and to utilize it in the splitting of water for the production of hydrogen gas and oxygen as a fuel source of energy.

In conclusion, I would like to acknowledge the following individuals for giving me the opportunity to do research at the Army Research Lab. Dr. Patrice Collins, OSD director; Dr. Johnathan Bolterdorf for his expertise; Greg Forcherio for his expertise in spectroscopic analysis and Dr. Kyle Grew, project collaborator.

Submitted by Dr. Michael P. Begaye, Dine College Science Faculty. Shiprock campus on 8/8/2018



ANNE SEMRAU FIELD TRIP

Bio 326 Ecology class field trip to Sand Island,
Students were collecting and identifying aquatic macro-
invertebrates as a measure of water quality.

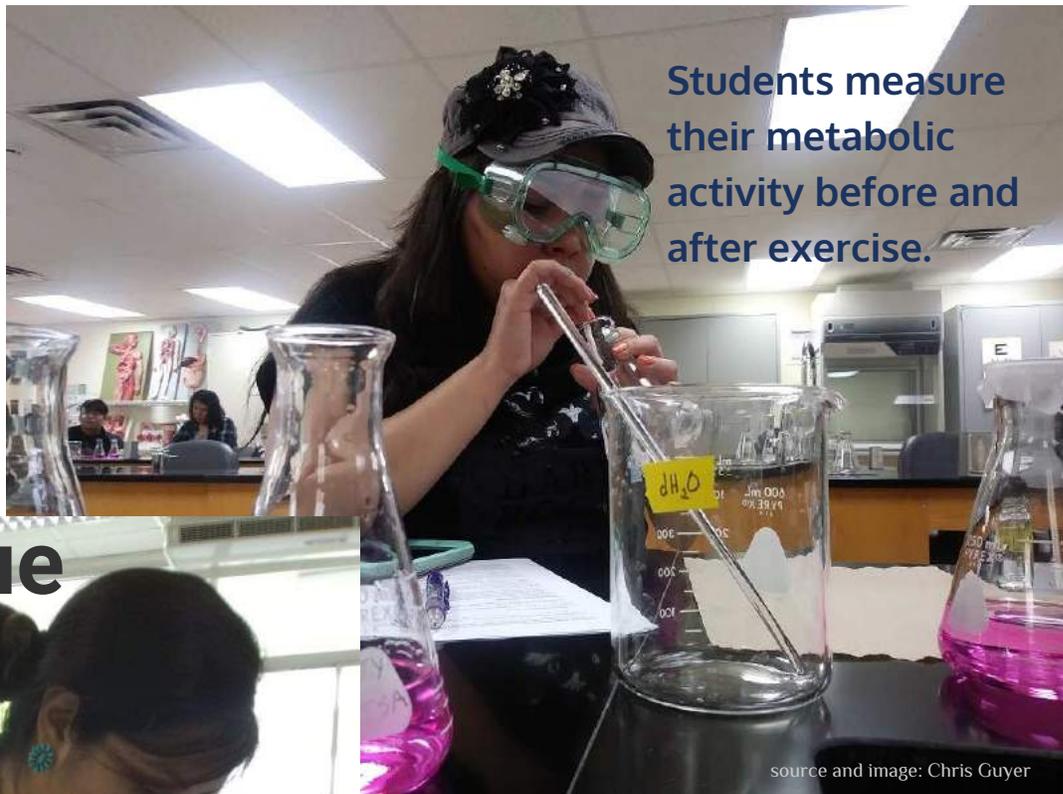


Source and image: Anne Semrau



Source and image: Anne Semrau

CHRIS GUYER BIOLOGY LAB - Shiprock campus

Students measure their metabolic activity

Students measure their metabolic activity before and after exercise.

source and image: Chris Guyer



monique
lopez

source and image: Monique Lopez

Mekong, Thailand

This past summer I was selected for the Research Experience for Undergraduates (REU) 2018, International Summer Research experience (ISURE) program: Indigenous America to Indigenous Mekong, Thailand: Adventures in Biology and Biodiversity program through the University of Arkansas. This program is extended, mainly to minority populations in the United States as a way to have representation in the science field of minorities. Research was a collaboration effort with the University of Arkansas and Mahasarakham University respectively. There were four different research topics. Students from across the United States were split into, based on these interests. The research topic I was assigned to and most interested in was the research topic of, **Antioxidant properties of Medicinal Mushrooms**. For this project four different types of regional mushrooms species were selected based on their edible and medicinal properties. This research is important since these mushrooms are known to stabilize free radicals in the body. Free radicals are naturally produced in the body and the body is able to stabilize free radicals itself. However, the presence of too many free radicals cause oxidative stress and are known to have harmful effects such as ageing, Alzheimer's, Parkinson's, as well as many other diseases and health conditions. Antioxidants are able to stabilize these free radicals and prevent the oxidation of free radicals which is why research is focusing on antioxidant properties. Three tests were performed to test these properties. The tests included, 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging capacity of mushrooms extracts, total phenolic content TPC of mushroom extracts, and total flavanoid content TFC. -Monique Lopez

engaging and educating the community



Source and Image: Kathryn Hartzell

Three Diné College students attended the "Engaging Communities in Education and Research" conference in Breckenridge, Colorado last week, September 20 – 23, 2018, sponsored by the Colorado Area Health Education Centers and the Colorado Clinical and Translational Sciences Institute (CCTSI).



Dorothea Paul-Wheeler, Public Health BS major at the Tsaiile Campus, presented a poster detailing methods and results of a student survey informing the development of **sexual assault prevention** programs at the College. Amber-Rose Waters, Psychology BA major at Tsaiile Campus (and AS Public Health) presented a poster on her work integrating Diné cultural concepts into **HIV education** materials and evaluating improvements in knowledge and attitudes outcomes. Jeri Garfield, Public Health BS major at Shiprock Campus, presented a poster describing her work on adapting and evaluating educational materials for families receiving new EPA-certified wood/coal burning stoves in the Shiprock area as part of a **Clean Air Act** settlement with the local power plant.

Support for stipends, travel and supplies for these students had been provided by the CCTSI this past summer. CCTSI has been providing supplemental funding of this kind for additional students each of the past 10 years of our Summer Research Enhancement Program. The students felt really successful and appreciated during the poster presentation and received a great deal of positive feedback and support from poster viewers, who were largely health researchers and providers. They also learned more about community health research from attending different conference sessions and were able to see public health research in action- which was both inspiring and affirming for them.

Faculty members Kate Hartzell and Mark Bauer learned more about the important work of CCTSI and about the partnerships that could form future research collaborations and mentorship opportunities for our students. We look forward to exploring future relationships within some of these exciting research arenas. ———Kate Hartzell



CLEAN
AIR



ACT

Shiprock North Campus Public Health Headquarters



We are so honored to welcome our new faculty member in Public Health, Dr. Carmella Kahn. Dr. Kahn recently finished her DrPH dissertation at the University of Arizona. She is not new to Diné College, however, as she has mentored students in the Summer Research Enhancement Program for three summers. Dr. Kahn is committed to both training health researchers and contributing to public health here on the Navajo Nation. For her, coming home felt like the next step in her professional journey. We are so honored to have her as part of our department!
Welcome Dr. Kahn!

source and image: Kathryn Hartzell

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please vote for Bond D.**

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Education for future
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Navajo Nation Economy**

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Filed for by the 2018 G.O. Bond for Education
Committee, Dr. Gerald Burke, Chairman

November 6, 2018

The public health program is holding a speakers series as part of their PUH 391 course entitled "Topics in Public Health Research." The speakers are currently doing health research on the Navajo Nation and come from a wide variety of health arenas. Presenters are giving students a first hand look at the many different aspects of the research process, sharing their research methods and conclusions as well as personal anecdotes about their roles as researchers on the Navajo Nation . Students in the course have been tasked with introducing the speakers and have been encouraged to have in-depth discussion with speakers about their educational journeys and their professional accomplishments. Feedback from both speakers and students has been that this has been a great exercise in learning and collegiality for all involved. Please join us Tuesday evenings from 6:00-7:30 PM. See list of speakers.



source and image: Kathryn Hartzell

PUH 391 Seminar in Public Health
*****Open to the public*****
Presenters for Fall 2018 semester



Location:
 Shiprock North Campus SMB 133
 Via ITV at:
 Tsaile GCB 102
 Chinle CHIN1
 Crownpoint CRWN 1
 Window Rock WRNB4
 Tuba City TCC 106

Contact: Carmella Kahn, DrPH, MPH
 Email: ckahn@dinecollege.edu

Date/time	Presenter	Research topic
Oct. 2, 2018, 6pm-7pm	Jani Ingram, PhD Northern Arizona University	Environmental Health Investigation of Well Water in the Cameron/Luepp Area
Oct. 9, 2018, 6pm-7pm	Katrina Claw, PhD; Nanibaa' Garrison, PhD; Rene Begay; University of Washington, University of Colorado Denver	Intro to Bioethics and the Role of Public Health Genetics in the Field of Genetics/Genomics
Oct. 16, 2018, 6pm-7pm	Laura Hammitt, MD; Ray Reid, MD Johns Hopkins Center for American Indian Health	Active Bacterial Surveillance for Staphylococcus Aureus on the Navajo and White Mountain Apache Reservations.
Oct. 23, 2018, 6pm-7pm	Sonya Shin, MD, MPH COPE Program	Evaluating the Navajo Community Outreach and Patient Empowerment (COPE) Program
Oct. 30, 2018, 6pm-7pm	Bonnie Duran, Dr.PH University of Washington	Tribal Colleges and Universities Alcohol, Drugs and Mental Health Epidemiologic Study (TCU-ADME)
Nov. 6, 2018, 6pm-7pm	Kimberly Mohs, MD Northern Navajo Medical Center	Navajo Area Indian Health Services - Cardiovascular Risk Reduction Demonstration Project
Nov. 13, 2018, 6pm-7pm	Nicole Neault, MPH Johns Hopkins Center for American Indian Health	Evaluation of an Edible School Garden Program; Evaluation of the Feast for the Future Community Visioning Program.
Nov. 20, 2018, 6pm-7pm	Lupita Montoya, PhD, MS University of Colorado Boulder	Asthmatic issues associated with air quality on Navajo Nation
Nov. 27, 2018, 6pm-7pm	Johnnye Lewis, Ph.D. University of New Mexico	Navajo Birth Cohort Study (NBCS)

..... Where to go for an
INTERNSHIP

Look here for news of faculty development activities, as well as other workshops, etc., including those sponsored by land grants, environmental science

More internships listed at [Diné College](http://www.dincolle.edu) website and contact info.

CCI Internship Term	Spring 2018	Summer 2018	Fall 2018
On-line Application Opens	July 16, 2018	October 16, 2018	March 19, 2018
Applications Due	October 8, 2018 5:00 PM ET	January 10, 2019 5:00 PM ET	May 30, 2018 5:00 PM ET
Offer Notification Period (Begin on or around)	October 15, 2018	January 25, 2019	June 7, 2018
All DOE Offers and Notifications Complete	December 21, 2018	April 2, 2019	August 7, 2018

US DEPARTMENT OF ENERGY

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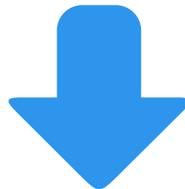
Look and like here for news of faculty development activities, clubs, as well as other workshops, etc., including live videos. The School of STEM is in the process of developing digital marketing, involving social media, so please look out for YouTube videos, Instagram post, and Podcast. We will be broadcasting with DC very own radio station KXWR. For now go to our [Facebook](#) for quick news.



@dinecollegestem

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more to come



Hello. I'm DC School of STEM Program Coordinator. Thank you for taking the time viewing the newsletter. We want to let the world know who the DC School of STEM is, what they are doing and why. If you would like to be part of the newsletter, email me at sonjabegay@dinecollege.edu

ENJOY!