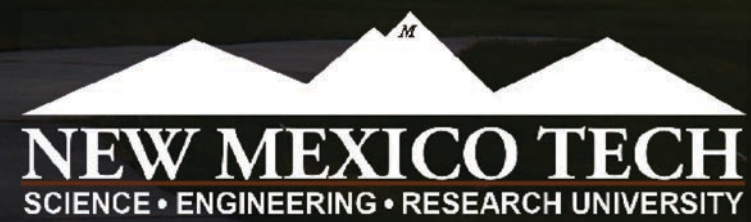


2020-21 ANNUAL REPORT



Advancing science, technology,
engineering, and mathematics to
meet the challenges of
tomorrow through applied
innovation, transdisciplinary
education, and effective
collaborations.

801 LEROY PLACE • SOCORRO, NM 87801 • 575-835-5600
EMAIL: PRESIDENT@NMT.EDU • WWW.NMT.EDU



MISSION STATEMENT

Serve New Mexico and beyond through exceptional education, research, and service, focused in science, technology, engineering, and mathematics.

Serve the public through applied research, professional development, and teacher education, benefiting the people of New Mexico.

Serve New Mexico through innovation to commercialization benefiting the economy of the state and creating opportunities for success.

ORGANIZATIONAL CHART

NEW MEXICO DEPARTMENT OF HIGHER EDUCATION

Stephanie Rodriguez, *Secretary*

NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY BOARD OF REGENTS

Deborah Peacock, *President*

Jerry Armijo, *Secretary/ Treasurer*

David Gonzales (2020)/David Lepre (2021)

Yolanda King

Veronica Espinosa

NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY

Dr. Stephen G. Wells

President

Dr. Peter Phaiah
Acting Vice President for Student Life

Dr. Olin Cleve McDaniel
Vice President for Administration and Finance

Dr. Van Romero
Vice President for Research

Dr. Douglas Wells
Vice President for Academic Affairs

NEW MEXICO BUREAU OF GEOLOGY AND MINERAL RESOURCES

Dr. Nelia Dunbar, *Director*

HUMAN RESOURCES

Jo Ann Salome, *Director*

PETROLEUM RECOVERY RESEARCH CENTER

Dr. Robert Balch, *Director*

MARKETING & COMMUNICATION

David Lepre Jr., *Director*

OFFICE FOR ADVANCEMENT AND ALUMNI RELATIONS

Colleen Foster, *Director*

GOVERNMENT RELATIONS

David Manzano, *Director*

OFFICE FOR EEOC AFFIRMATIVE ACTION

Randy Saavdra, *Director*

OFFICE OF INNOVATION COMMERCIALIZATION

Dr. Peter Anselmo, *Executive Director (2020)*

Dr. Myrriah Tomar, *Executive Director (2021)*

PLAYAS RESEARCH AND TRAINING CENTER

Carlos Romero, *Director*

NEW MEXICO TECH FOUNDATION

OFFICERS

Joanna DeBrine, *President*

Jerry Armijo, *Vice President*

Jeff Corey, *Secretary/ Treasurer*

Colleen Foster, *Executive Director*

BOARD OF TRUSTEES

Borden Putnam

William Daily

Raven Goswick

Dr. Raul Deju

Clinton Mars

Dr. Cleve McDaniel

Matthew Silva

Damian Banks (Student)

Raven Goswick

Lisa Noell

Geraldine Rivera

Borden Putnam

Dr. Stephen G. Wells

NEW MEXICO TECH UNIVERSITY RESEARCH PARK CORPORATION

President

Donald Monette (2020)

Dr. Van Romero (2021)

Secretary/ Treasurer

Dr. Peter Anselmo

Callum Bell

Ernie C'deBaca

Dale Dekker

Jeb H. Flemming

Ben Harburg

Memo Inal

Dr. Yolanda King

Dr. Cleve McDaniel

Damian Ocampo

Dr. Warren Ostergen

Dr. Myrriah Tomar

John Saiz

Larry Udell

Dr. Stephen Wells

FISCAL YEAR 2022 BUDGET INFORMATION
(Continued)

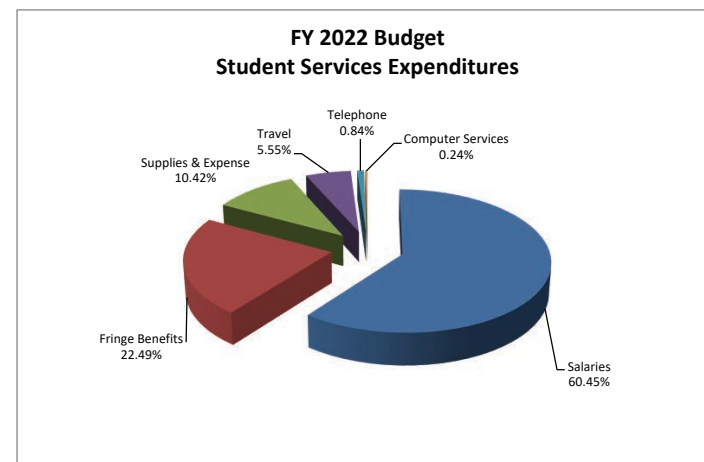
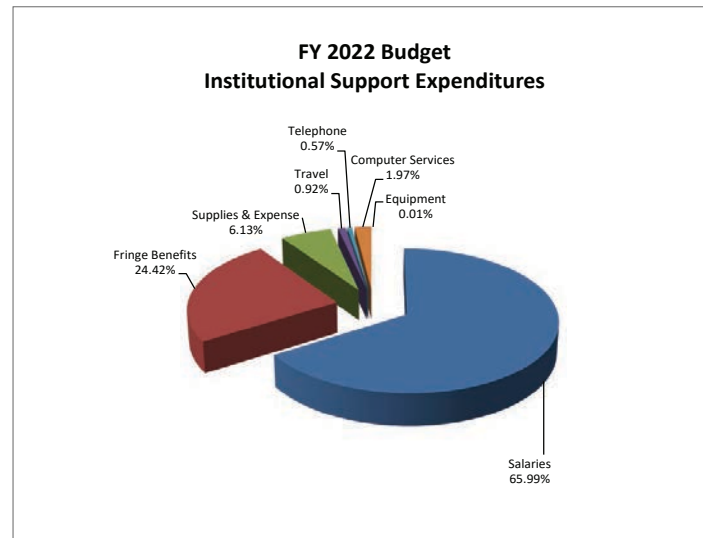
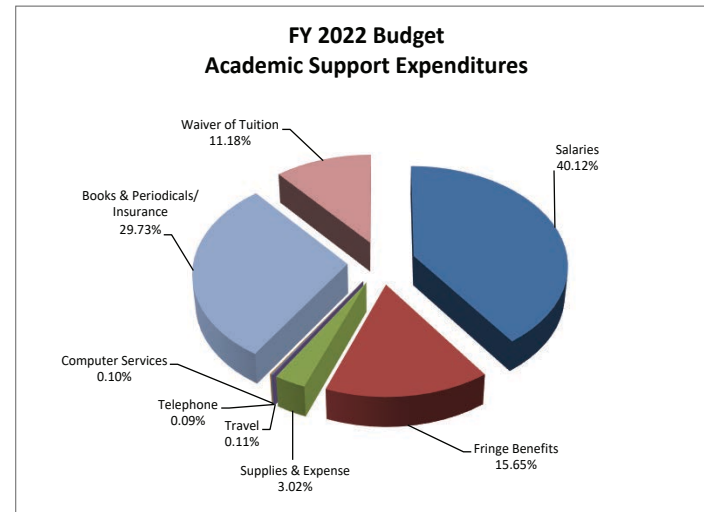
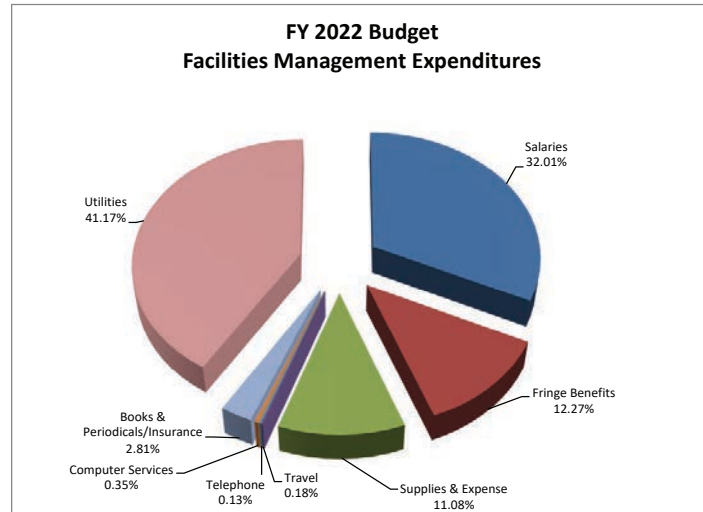


TABLE OF CONTENTS

02 MISSION STATEMENT

13 NEW MEXICO TECH STUDENT SNAPSHOT

04 MESSAGE FROM PRESIDENT WELLS

14 LEVERAGING INNOVATION AND INVESTING IN THE FUTURE

05 NATIONAL RECOGNITION

16 CONTINUOUSLY IMPROVING THROUGH COLLABORATIONS

07 FACULTY AND STUDENT ACHIEVEMENT

19 NMT BY THE NUMBERS

11 ENSURING AND MEASURING STUDENT SUCCESS

23 ORGANIZATIONAL CHART

PRESIDENT'S MESSAGE



Dear Friends,

As President of New Mexico Tech, I am honored to present the strides our institution has made over the previous year towards the goals in our decadal plan, "Blueprint 2027." NMT had an eventful 2020-21 as we moved to greater heights in our academic and research endeavors and our STE²M initiatives.

NMT annually receives national accolades for the quality of instruction and the value we provide our students. A critical part of our educational mission is hands-on research opportunities for students, and for decades we have focused on involving undergraduates on projects in every department. I am also proud of the accomplishments of our exceptional faculty – particularly in research and instruction, but also in outreach and community service. You will find numerous examples of these efforts throughout the annual report.

I would, however, like to highlight a few significant accomplishments from the past two years.

- NMT now proudly has four national Science Foundation CAREER Award winners on faculty. Dr. Joel Sharbrough recently joined Dr. Chelsey Hargather, Dr. Caitano da Silva, and Dr. Alex Gysi as recipients of this prestigious honor.
- Dr. Lorie Liebrock, the Executive Director of NMT's Cybersecurity Center of Excellence, was named a Women in Technology Award Honoree for 2021 by the New Mexico Tech Council, joining Dr. Sharon Sessions, herself a 2020 honoree.
- NMT has been the recipient of numerous federal grants that will improve lives around the globe. NMT is leading the way in CO₂ storage, rare-earth minerals development, and working with NASA to study our universe.

- Finally, NMT has signed an important memorandum of understanding with Navajo Technical University to help develop water purification technologies that can provide potable water to the Navajo Nation and beyond.

On behalf of the Board of Regents and my leadership team, thank you for your continued support of this special institution.

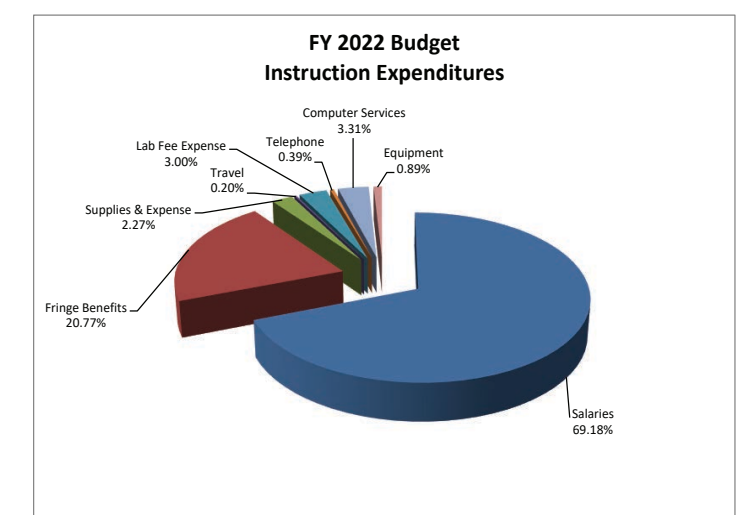
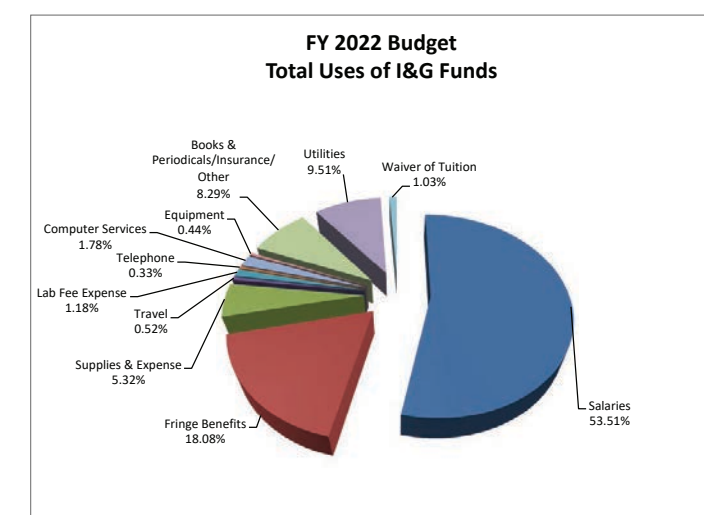
Warm Regards,

Dr. Stephen G. Wells
President
New Mexico Tech

Statement of Revenues, Expenses, and Changes in Net Position (Continued) For Year Ended June 30, 2021

Change in value of pension liability	64,879,804
Other postemployment benefits expense	5,887,494
Other operating expenses	14,466,650
Benefit trust expenses	417,042
Total operating expenses	196,692,244
Operating loss	(122,784,133)
NONOPERATING REVENUES	
State appropriations	\$ 38,056,512
Gifts	1,986,732
Interest and investment income, net	(14,362)
Net nonoperating revenues	40,028,882
Gain before other revenues and expenses	(82,755,251)
OTHER REVENUES AND EXPENSES	
Other revenues	9,155,967
Additions to permanent endowments	17,317,948
State land grant permanent fund income	1,941,460
Capital project appropriations from state issued bonds and other	1,187,124
Net other revenues	29,602,499
Change in net position	(53,152,752)
NET POSITION, beginning of year	155,542,410
NET POSITION, end of year	\$102,389,658

FISCAL YEAR 2022 BUDGET INFORMATION



Statement of Net Position (Continued)
As of June 30, 2021

DEFERRED INFLOWS OF RESOURCES	
Related to pensions	\$ 3,305,280
Related to other post-employment benefits	4,500,301
TOTAL DEFERRED INFLOWS OF RESOURCES	\$ 7,805,581
 NET POSITION	
NET INVESTMENT IN CAPITAL ASSETS RESTRICTED FOR	\$138,326,551
Nonexpendable	
Endowments and all other nonexpendable	75,311,587
Inventory	1,929,710
Expendable	
Scholarships, research, instruction and other	10,092,949
Other postemployment benefits	(35,832,195)
Employee benefit trust	5,040,082
Loans	1,065,370
UNRESTRICTED NET (DEFICIT) POSITION	(93,544,396)
Total net position	\$102,389,658

Statement of Revenues, Expenses, and Changes in Net Position
For Year Ended June 30, 2021

OPERATING REVENUES	
Tuition and fees, net of discounts and allowances	\$ 9,630,017
Federal grants and contracts	36,119,887
State and local grants and contracts	3,263,545
Private grants and contracts	8,841,476
Other grants and contracts	3,868,399
Sales and services of auxiliary enterprises, net of allowances	3,580,483
Other	8,190,157
Benefit trust contributions	414,147
Total operating revenues	73,908,111
 EXPENSES	
Instruction and general	
Instruction	17,634,893
Institutional support	7,526,171
Operations and maintenance support	5,300,625
Student services	2,455,947
Academic support	2,986,628
Other sponsored activities	27,525,380
Research	25,019,145
Student aid grants and stipends, net of tuition discounts and allowances	7,995,603
Depreciation and amortization	10,856,154
Auxiliary enterprises, net of discounts and allowances	3,740,708

NEW MEXICO'S HIGHER EDUCATION GEM

**NATIONAL
RECOGNITION**

New Mexico Tech's world-class curriculum and research centers provide opportunity, funding, and research focus to students and valuable learn-on-the-job experience for future scientists and engineers.

Our national rankings tell the story. They are the measurements of the quality and value of education at New Mexico Tech.

Niche.com

- #1 Top Public University in New Mexico
- #4 Best Hispanic-Serving University in America
- #49 Top Public University in America
- #59 Colleges with the Best Professors
- #90 Colleges with the Best Academics



New Mexico Tech was once again acknowledged by Niche.com's 2021 College Rankings as New Mexico's Best College, College with the Best Academics, Best Value College, and New Mexico's Top Public University.

U.S. News & World Report

- #5 Top Public College
- #18 Best Regional University, Western United States
- #31 Best Value School
- #102 Top Performers for Social Mobility

New Mexico Tech repeated its ranking as one of the top regional universities in the United States. In the 2020 U.S. News and World Report college rankings for the western United States, Tech was tied for the #5 "Top Public College," and is ranked the #18 best Regional University in the western U.S.



CNBC

CNBC named New Mexico Tech to its Top 25 Public Universities That Pay Off The Most ranking in 2020.

New Mexico Tech's National Rankings

- #12 Hispanic Serving Institution in America -Niche.com, 2022
- # 59 100 Collges Whose Grads Earn the Most - Newsweek
- #1 College in NM, Top 50 Nationwide for Getting a Job - Zippia.com
- #1 Materials and Mechanical Engineering Programs -College Factual, 2020
- #7 Best Value Colleges - Return on Investment -Payscale.com, 2022
- #1 Public University in America for B.S. Graduates to go on and earn a Ph.D. - National Science Foundation
- #1 Best Bachelor Programs for Engineering and Physics Best Value -College Factual, 2020
- Top 1% Nationally in Physics and Engineering, Top 5% in Computer and Information Sciences, Materials Engineering, Electrical Engineering, Mechanical Engineering, and Physical Science - College Factual, 2021
- Top 1% Best Value/Engineering - College Factual, 2019

New Mexico Tech's Joel Sharbrough receives National Science Foundation CAREER Award

Sharbrough one of four NSF CAREER Award winners currently at New Mexico Tech

A cutting-edge plant genomics research project underway at New Mexico Tech is garnering national recognition for its potential to understand the diversity of life as well as to inspire early career scientists. The National Science Foundation (NSF) recently awarded evolutionary biology assistant professor Joel Sharbrough, Ph.D., a \$1.2 million CAREER Award to lead the project over the next five years.

The NSF selected his project for one of its largest-ever grants, Sharbrough said, because of its dual goals of understanding energy production in plants and the valuable experience its inherent hands-on research participation provides to young scientists.

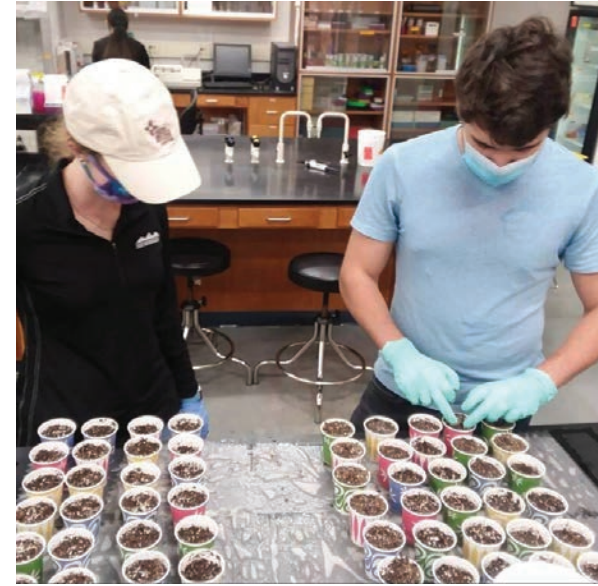
Sharbrough said his project's goal of integrating education and real-world research is what excites him most about the work ahead over the next five years.

"Helping young scientists to find their own path in science while at the same time contributing towards our fundamental understanding of plant biology – that's really the bottom line," he said.

According to Sharbrough, NMT is uniquely qualified -- as a small, science-focused university and research institution -- to lead this type of project because of its ability and commitment to providing meaningful research lab opportunities to both graduate and undergraduate students and to its mission of serving a key demographic -- Hispanic students.

"One of the centerpieces of the grant is being able to do these types of research-based courses," he said. "Big universities just don't really have the capacity to do this. That's in large part why I came to Tech – the emphasis on research." Another key aspect of the project is capturing the interest of young scientists at a critical point in their lives, when many high school students are determining their academic and career paths. Sharbrough said his team plans to spend time in classrooms at both Socorro High School in Socorro, New Mexico, and at North Tahoe High School in his hometown of Tahoe City, California.

A key motivation behind getting out into classrooms and connecting high school students to meaningful research is



NMT students Bailey Dodson, left, and Johnny Raymond participate in a biology lab class.

to inspire future science careers, Sharbrough said. In addition to learning about the DNA sequencing revolution, students also will gain knowledge of the technical aspects of being a scientist – making observations, creating a hypothesis, testing the hypothesis, and drawing conclusions.

Knowledge gained from the project will be disseminated to students and scientists through the production of national and international conference presentations, publications in academic journals, and manuscripts.

Sharbrough joined the biology faculty in 2021 to teach bioinformatics and evolution and lead Course-based Undergraduate Research Experiences (CURE) projects. He earned a bachelor's degree in biological sciences from the University of Notre Dame and a secondary school teaching certificate from Saint Mary's College, both in Notre Dame, Indiana, and a doctorate in biology from the University of Iowa in Iowa City, Iowa. Sharbrough was a postdoctoral research fellow at Colorado State University in Fort Collins, Colorado, from 2016 to 2020, where he studied cytonuclear interactions of allopolyploids.

**New Mexico Tech
National Science Foundation
CAREER AWARD WINNERS**

Joel Sharbrough, Biology
Chelsey Hargather, Materials Engineering
Caitano da Silva, Physics
Alex Gysi, Earth and Environmental Science

Statement of Net Position As of June 30, 2021

NMT BY THE NUMBERS

ASSETS	INSTITUTE
CURRENT ASSETS	
Cash and cash equivalents	\$33,942,407
Short-term investments	19,557,317
Contract and grant billed and unbilled receivables	13,968,070
Student accounts receivable, net of allowance for doubtful accounts	546,522
Due from state agencies and other accounts receivables	2,212,712
Inventories	1,929,710
Other assets	1,892,255
Total current assets	74,048,993
NONCURRENT ASSETS	
Restricted cash and cash equivalents	699,424
Endowment investments	69,156,170
Other long-term investments	22,910,462
Capital assets, net of accumulated depreciation	156,548,122
Other non-current assets	658,695
Total noncurrent assets	249,972,873
TOTAL ASSETS	\$324,021,866
DEFERRED OUTFLOWS OF RESOURCES	
Related to pensions	\$122,517,625
Related to other post-employment benefits	5,663,350
TOTAL DEFERRED OUTFLOWS OF RESOURCES	\$128,180,975
LIABILITIES	
CURRENT LIABILITIES	
Accounts payable and accrued liabilities	\$ 7,792,601
Bonds payable, current portion	785,000
Accrued compensated absences, current portion	4,415,208
Deposits	192,800
Unearned revenue	766,530
Total current liabilities	13,952,139
NONCURRENT LIABILITIES	
Accrued compensated absences, net of current portion	4,564,597
Bonds payable, net	18,095,266
Net pension liability	262,966,133
Net OPEB liability	36,995,244
Other noncurrent liabilities	5,434,223
Total noncurrent liabilities	328,055,463
TOTAL LIABILITIES	\$342,007,602

ICASA's Criminal-Justice Portfolio

ICASA is emerging as a premier research and development center supporting the State of New Mexico's criminal justice and public safety programs and systems. Its criminal justice work began in earnest via a partnership in 2018 with the Bernalillo County District Attorney's Office (2nd DA) to integrate criminal-justice system data and build the data infrastructure and analytical tools for use by the DA's Crime Strategies Unit. This initial work has expanded to both wider collaboration with the 2nd DA's office and to wider partnerships with other state and local level criminal justice programs. These partnerships have expanded ICASA's reach across multiple programs, each having unique data sources for ICASA to integrate, which in turn are serving to advance the holistic, collaborative, and responsible sharing of criminal justice data statewide. ICASA's sponsored research activity with NM's criminal justice programs are discussed below.

Project overview for development of Criminal Data Hub

- Develop a replacement for the NM Consolidated Offender Query (COQ) system, enabling analysts in the state's Criminal History Clearinghouse (CHC) to produce comprehensive criminal history reports for current arrests from a single query, including data from: NCIC, NMCJIS, NMLINC, Odyssey, and others
- Develop a Criminal Data Hub (CDH), building off of COQ queries for the purposes of integrating data analytics from COQ sources and from the 2DA Crime Strategies Unit
- Develop tools to aid in the advancement of the Impact Driven Prosecution strategy at the 2nd DA

Partners: Bernalillo County District Attorney, NM Department of Public Safety (DPS)
 Collaborators: NM Administrative Office of the Courts, NM Administrative Office of the District Attorney

Project overview for development of Single State ID

- Based on legislation passed in 2019 (HB267), support the integration of the unique biometric Single State ID (SID) into the component criminal justice and public safety databases statewide
- Create a prototype Jail Unified Management (JUM) application for allowing for the aggregation and analysis of detention center data statewide

Partners: NM Sentencing Commission
 Collaborators: NM Association of Counties, NM Department of Public Safety, NM Administrative Office of the Courts

Project overview development of Data Integration Project

- Explore techniques for integrating behavioral health data into various Bernalillo County component criminal justice systems
- Via these integrations, explore the ability to share relevant behavioral health data with County first responder and public safety officials to better inform responses
- Develop an application to handle a streamlined Release of Information (ROI) business process for use in disseminating behavioral health data to approved individuals

Partners: Bernalillo County, 2nd District Criminal Justice Coordinating Council
 Collaborators: NM Sentencing Commission, NM Administrative Office of the Courts

Project overview for development of the Case Catcher Project

- Implement Bernalillo County District Attorney Raúl Torrez' vision for creating a 'Turbo-Tax like' system for automated case referral to the DA's office from law enforcement partners, in part to simplify and demystify the case referral process
- Create an electronic case submission interface to the 2nd DA's office for the referral of criminal cases, to include management of submitted discovery items, tracking of case status and progress, and iterative development of relevant case factors
- Integrate the case submission interface to the general workflow of the 2nd DA's office, to include advanced analytics associated with individual offenders for the purposes of enabling greater efficiencies and intelligence-driven prosecution

Partners: Greater Albuquerque Chamber of Commerce, ABQ's Bernalillo County District Attorney's Office
 Collaborators: Albuquerque Police Department, Bernalillo County Sheriff's Office, NM State Police

FACULTY AND STUDENT ACHIEVEMENT

N.M. Tech Council Names Dr. Lorie Liebrock Among 2021 Women in Technology Honorees

Computer science professor recognized as a STEM leader

The New Mexico Tech Council recently announced the Women in Technology Award Honorees for 2021. New Mexico Tech computer science professor Dr. Lorie Liebrock is among this year's six winners.

Dr. Liebrock has extensive experience in cybersecurity and parallel and high-performance computing. She has been a featured speaker for the NM Tech Council at the group's Spring Technology Conference. Dr. Lorie M. Liebrock is the Director of the New Mexico Cybersecurity Center of Excellence for Economic Development and the New Mexico Tech Cybersecurity Education Center. She leads various projects, such as a Summer Institute with Sandia National Laboratories, and serves as P.I. on several research projects.

This is the second year in a row that an NMT professor is among the WIT honorees. Last year, physics professor Dr. Sharon Sessions won the same award.

"The fact that we have two winners two years in a row shows the impact that New Mexico Tech has on technology in the state of New Mexico," Liebrock said. "And the two of us are in very different fields and we are having a positive impact."

Liebrock joined the NMT faculty in 2002 and was the only woman faculty member in the department at that time. She became a full professor in 2011 and was the first woman to be the graduate dean at NMT, serving from 2011 to 2019.

Liebrock said she has faced gender-based challenges and obstacles throughout her career in STEM but they only served to steel her resolve to succeed.

"I have encountered a few barriers along the way," Liebrock said. "At times, I was told, 'No, you're not going to be successful.' Being stubborn, I said, I'll show them."

Being honored as a top woman in science and technology made her reflect on her long road to the top of her field.

"I guess this award gets you to reflect on what you can accomplish as a first-generation college student," Liebrock said. "It just shows that our New Mexico students in particular who don't have the backgrounds that are typical, these first-generation students like me, can have a signifi-

cant impact."

Liebrock grew up on a dairy farm in rural Michigan in the Saginaw area. She earned her associate's from Delta College in Bay City, then transferred to Michigan Tech in Houghton in the Upper Peninsula, where she earned a bachelor's and a master's in computer science. She then attended Rice University in Houston where she earned a second master's and her Ph.D. in computer science.

Liebrock is the co-principal investigator for NMT's NSF-funded Scholarship for Service Program in which she has mentored over 70 students who have gone on to government service in security. She has extensive experience in cybersecurity and parallel and high performance computing. She has published 26 journal articles, 39 conference and workshop papers, and holds two U.S. patents.

Each year, the New Mexico Tech Council recognizes women who represent myriad STEM industries and show an exemplary commitment to mentorship and community impact.

This year's applicant pool was overwhelmingly talented, diverse, and passionate. The applicants were evaluated on four criteria: Impact to their Profession, Volunteerism, Mentorship, and Entrepreneurialism. The Council considered 49 nominations and 24 applications, an exceptional testament to the legacy of this program and the accomplishments of women in STEM. The Council selected six winners and one early career honoree.



Dr. Lorie Liebrock

NMT Graduate Student Wins Competitive NASA 'Future Investigator' Grant

Zoë Havlena will study gypsum samples as potential recorders of ancient life and extraplanetary ecosystems

NMT Earth and Environmental Science graduate student Zoë Havlena was awarded a prestigious NASA grant to fund her doctoral research in geomicrobiology.

Her project is "Interpreting Acidic Gypsum Deposits as Hosts for Past and Present Microbial Life." Havlena (pictured at right) will be collecting and analyzing gypsum samples from four cave systems in an effort to shed light on how life could grow in harsh ecosystems such as other planets or moons.

The FINESST award, or Future Investigators in NASA Earth and Space Science and Technology, is for graduate research proposals through the NASA Science Mission Directorate. Havlena's proposal was funded through the Planetary Science division which fielded 249 proposal applicants and only awarded 32 grants. The grant is for three years and will cover the remainder of her Ph.D. studies at New Mexico Tech.

Havlena is the "Future Investigator" and wrote the majority of the proposal with guidance from her advisor, Dr. Daniel Jones, who is the P.I. on the project. Jones is a faculty member in the Earth and Environmental Science Department and the Academic Director of the National Cave and Karst Research Institute, NMT's division in Carlsbad.

Havlena said gypsum is a mineral of interest in the search for life on Mars since the surface is thought to contain similar mineral deposits that formed from highly acidic waters.

"On Earth, we can study how biological material is preserved in similar acidic gypsum deposits and use this information to improve our understanding and ability to detect any evidence of extraplanetary life," Havlena said. "Although we know that acid-tolerant 'extreme' microbes help in the formation of gypsum in these systems, we don't fully understand how they inhabit the gypsum itself or how well the evidence of their activity is preserved over geologic timescales."

Astrobiologists have studied the microbes that inhabit gypsum crusts on the Earth's surface, but there is also acidic gypsum in special cave systems known as sulfuric acid caves. These caves are ideal "natural laboratories" for research since the ecosystem within is supported by unique forms of life and is not subject to surface influences like photosynthesis. The NASA Astrobiology Strategy characterizes these kinds of subsurface environments as important targets for studying the kind of rock-hosted extreme



Zoë Havlena

life that may exist on other planets.

Havlena will take samples from four cave systems: the Frasassi and Acquasanta caves in Italy, Carlsbad Caverns in New Mexico, and Lehman Caves in Great Basin National Park in Nevada. The Italian caves are one of the few locations in the world where this sulfidic process is actively happening today, while the now inactive Carlsbad Caverns formed several million years ago and retains "ancient" gypsum deposits. Lehman Caves is theorized to have formed in a similar way and may be even older, potentially up to 10 million years old.

"The timescale of gypsum ages from these systems is a key part in developing our understanding of how well this mineral may or may not preserve evidence of life," Havlena said.

This project will use a multidisciplinary approach involving microbiology and molecular biology, organic geochemistry, and mineralogical analyses. She will work with collaborators at NASA's Goddard Spaceflight Center to search for biomarkers, which are special biological compounds that may last in the environment for a long period of time.

"The information I obtain from this project will hopefully transform our understanding of how life uses acidic gypsum on Earth, and how it may do so on Mars or other planets," she said.

Havlena was born in Albuquerque and grew up in Madison, Wisconsin. She returned to New Mexico for college and got her bachelor's in biology at NMT in 2017, followed by her master's in biology in 2019. She is also an incident commander for New Mexico Search and Rescue.

as how to collect, analyze, and test samples. He also sees opportunities for expanded collaborations.

"There are multiple benefits I see here," Guy said. "We are starting with water, but also I'm sure there will be other opportunities to do other research and seek other grants."

The ceremony, held in a hogan on the NTU campus, started with a traditional Navajo prayer. NMT President Wells said the project is dear to him because he did summer field work in Crownpoint when he was on the faculty at UNM. The ceremony closed with Dr. Guy presenting a traditional Navajo blanket to Dr. Wells.

Navajo Nation Water Purification Project

The Navajo Technical University-New Mexico Tech Navajo Nation Water Purification Project (N4WPP) is a joint endeavor to install water filtration equipment testing facilities on the Navajo Nation. These sites will be used to train students to test water quality and maintain filtration units to provide sustainable long-term water resources suitable for agriculture and livestock use, cleaning, and eventually clean drinking water.

Testing and modification of the initial units will provide the foundation for increasing access to usable water across the Navajo Nation while providing several critical outcomes:

- NTU students will be trained in database management, water sampling and analysis techniques, plant operations, and data analysis.
- Classroom learning will be augmented with field sampling planning, plant management, critical thinking, and communication skills.
- New facilities will be installed and tested at inactive wells with the ultimate goal of providing sorely needed new water sources and improved water quality to Navajo communities.
- Establishing a new working group and emerging workforce will create infrastructure for sustainable water resources in the Navajo Nation for decades to come.

Making an Impact

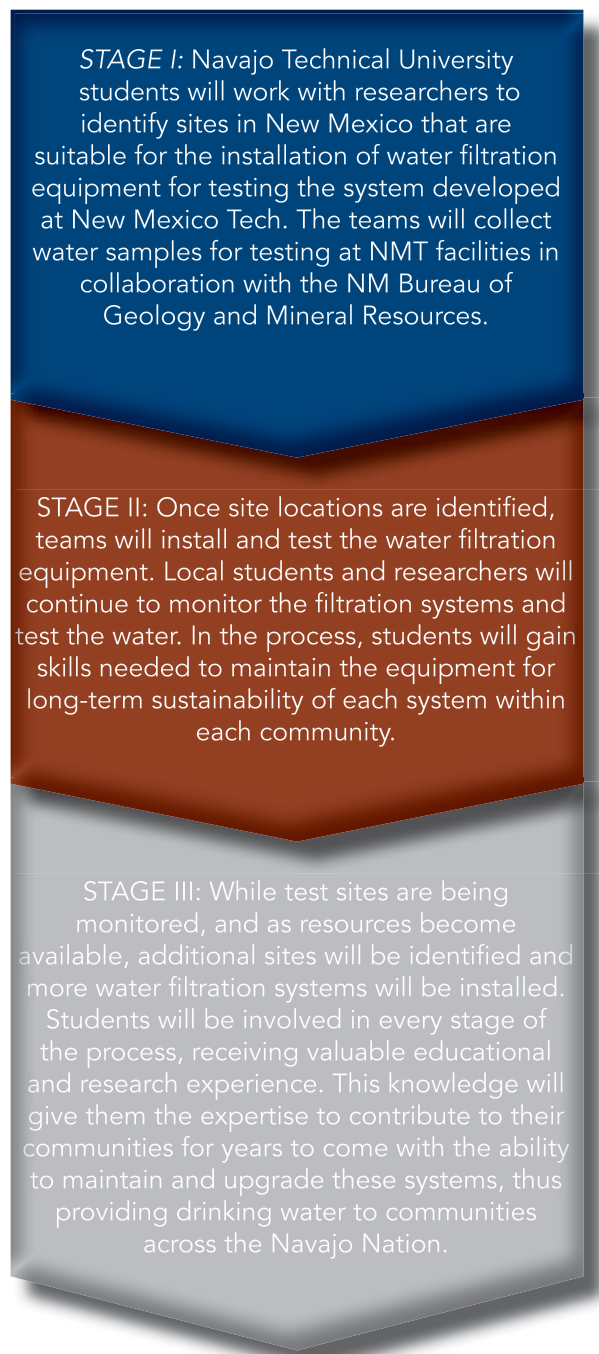
Quality water on the Navajo Nation has been a long-time challenge. Water on the Navajo Nation suffers from high levels of dissolved salts and metal contaminants, which can occur naturally or by human activities like as mining and oil extraction. Affected waters can be unsuitable for agricultural and livestock use, let alone human consumption.

The idea of the Restore project is to deploy technologies to help with the water purification needs of the Navajo Nation. In doing so, the project will pair innovation with business knowledge and capacity to produce cost-effective

solutions to the problem.

The long-term goal is to provide portable units throughout the Navajo Nation through NTU, NMT, and PESCO's combined efforts.

Project Timeline



CONTINUOUSLY IMPROVING THROUGH COLLABORATIONS

NMT Signs Agreement With Navajo Tech To Deploy Water Purification Systems

New collaboration will provide clean water and open pathways for future joint projects

New Mexico Tech and Navajo Technological University signed an historic Memorandum of Understanding in September, 2020, to collaborate on a water purification system on the reservation, paving the way for future cooperative projects.

NMT President Dr. Stephen Wells and NTU President Dr. Elmer Guy presided over the signing ceremony on the NTU campus in Crownpoint, along with NTU leaders and students, NMT administrators and scientists, and industry guests.

Wells said this new MOU will provide ample opportunities for professors and students at both institutions to advance water purification technology.

“Not only is this a great achievement for both New Mexico Tech and Navajo Tech, but it’s an honor for the two universities to share their knowledge and share their expertise for the people of the Navajo nation,” President Wells said.

The memorandum specifically addresses a collaborative project to implement water purification technology developed at the Petroleum Recovery Research Center at New Mexico Tech. The N.M. Bureau of Geology at NMT will also be involved in working with NTU.

While the new water filtration technology was developed for deployment in the oilfields, the purification units will help Navajo communities with clean water for human consumption, livestock usage, and agricultural purposes.

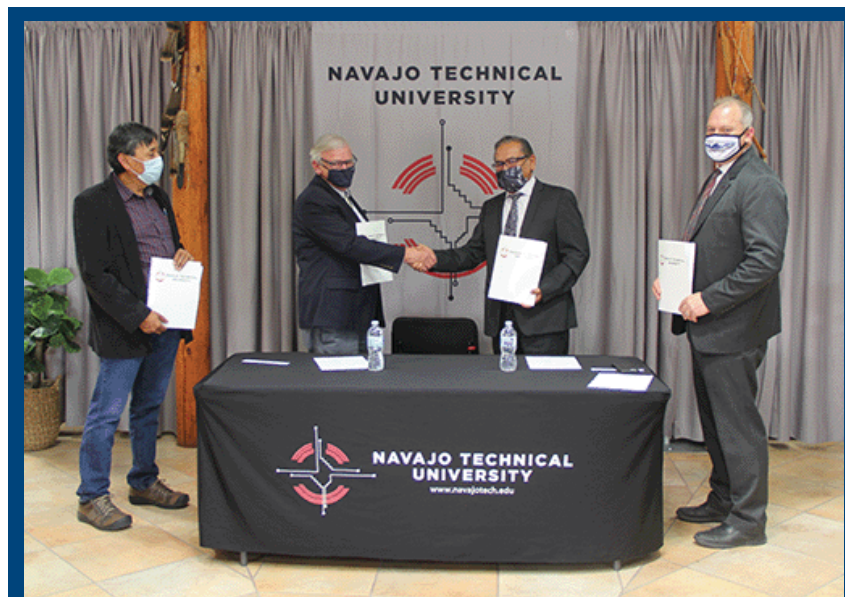
NTU President Dr. Elmer Guy said the pandemic has shed new light on the lack of available clean water on the Navajo Reservation and other Native American communities in the Southwest.

“If you have clean water, you’re helping the fight against the virus,” Dr. Guy said. “Also, with the pandemic, there are things we can learn from each other about safety measures.”

Dr. Robert Balch, director of the PRRC, said NMT has partnered with a Farmington company to build the purification units using hollow membrane fibers developed and manufactured in Socorro. NMT will donate six water purification systems to rural communities in New Mexico.

“We have commercial development for a produced-water purification system,” Balch said. “But it can purify water of any type. This does have a joint purpose of approving the technology for domestic use, but it’s also the right thing to do.”

Dr. Guy said the implementation of filtration systems will provide opportunities for NTU students and faculty to learn about water standards, system maintenance, and water chemistry, as well



(Pictured are (from left) Steve Grey, Executive Committee Chair of the Four-Corners Economic Development Corp.; Dr. Stephen G. Wells, New Mexico Tech President; Dr. Elmer Guy, Navajo Technical University President, and Dr. Robert Balch, Director of NMT’s Petroleum Recovery Research Center.)

Student Team Wins National ‘Capture The Flag’ Competition

Cyber Janitorial Security Services team takes first place in two-day event

A team of NMT students took first place in a national Capture The Flag Competition hosted by KernelCon.

Luke Reynolds, Shad Gudmunson, Spencer Merrill, Owen Parkins, and Bryan Hatton joined forces as the Cyber Janitorial Security Services team.

“This is a big deal,” Parkins said. “This is one of the newer conferences, but a lot of big names go there.”

The competition was March 27 and 28, with teams from across the country joining the competition. The event involved a series of cyber security challenges, each involving finding a key piece – or capture the flag – to earn points.

Parkins said the team got very little sleep over the two-day event. Due to social distancing, the Cyber Janitorial team interacted via Zoom as they proceeded through the challenges. Parkins said the challenges included combing through files, hacking a machine, and other computer sci-

ence tasks. With each round, the challenges became more difficult.

With one hour to go, the NMT team was in second place but more than 1,200 points behind the leaders. The Cyber Janitors completed three tasks in the time remaining and earned enough points to take the lead and win the event by 100 points with 5,075 total.

With the victory, the team members earned “Eternal Kernel” badges, which grants them free entry into Kernelcon and other similar conventions for life (<https://kernelcon.org/about#reciprocity>).

Everyone who participated also got an invite to participate on Hatton’s and Parkins’ DefCON qualification team.

“Everyone performed amazingly and really put in the work to make the victory a reality,” Parkins said. “I’m really proud of the team and hope to keep doing CTFs with them. Because of our performance at Kernelcon and the people on the team, I truly think we have a good shot at participating at DefCON this year.”



(From left are Bryan Hatton, Luke Reynolds, Shad Gudmunson, Spencer Merrill (the ghost), and Owen Parkins.)

2021 Top Student Awards

Casper Huang Wins Brown Award; Tiffany Nelson and Cameron Zielinski win Cramer Awards; Talysa Ogas Viera wins both Langmuir and Founders Award

Casper Huang – Brown Award

Casper is a native of Socorro and a graduate of Socorro High School. He sports a GPA of 3.99 and was named a Macey Scholar for his senior year. He took his first class – Intro to Engineering – at NMT when he was 13 years old, and has been a part of the campus community for 9 years. In that first class, he designed and 3D printed a catapult that won the class competition against much older students.

While in high school, he started working in Dr. Snezna Rogelj's lab in the Biology Department. Casper has tutored at local elementary schools and for the NMT Office of Student Learning. He currently serves as an officer in the Engineering Honor Society.

For the past three years, he's worked in the Physics Department machine shop for the Research Division. That experience resulted in him serving as technical advisor for the Soapbox Derby Challenge for local middle schoolers. He wrote a paper about that initiative, which he presented at the American Society for Engineering Education conference in 2020.

As a member of the New Mexico Tech sounding rocket team, he was instrumental in the team's design and fabrication work this year. Casper has been a leader of design teams and his machining experience, and his advice has been an invaluable resource to multiple faculty and student projects.

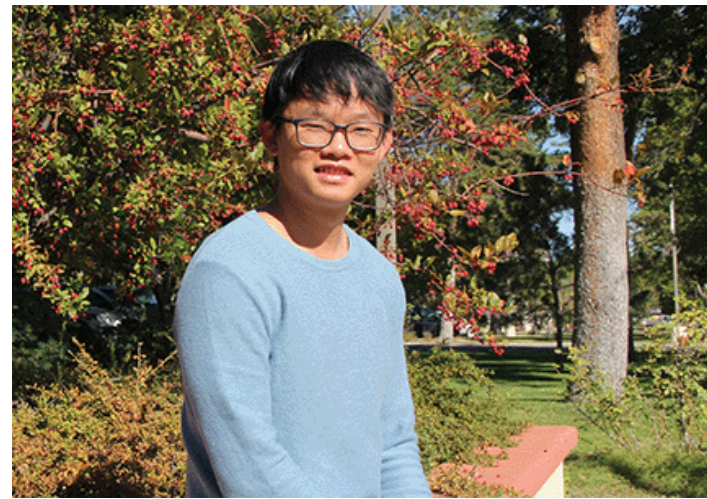
Tiffany Nelson – Cramer Award

Tiffany finished with a 3.96 GPA and has completed multiple internships. In the last semester of her junior year, she was the team lead for NMT Fusion competing in NASA MITTIC 2020. That team was chosen as one of the top ten teams to present at Johnson Space Center for their research on the NASA patented Variable Power Handheld Laser Torch.

She was noted for her exceptional academic record and her leadership activities throughout her undergraduate career. Tiffany has accepted a job with Analog Devices in Albuquerque.

Cameron Zielinski – Cramer Award

Cameron finished with a perfect 4.0 GPA and a remarkable record of research, community service, and leadership. In the nomination process, one professor said that Cameron's homework assignments were better than the answer keys. He was noted as studious, polite, and respectful, in addition to being at the top of every class.



Casper Huang – 2021 Brown Award winner

Cameron preformed laboratory research with Professor Rodolfo Tello-Aberto doing organic synthesis of lactone-based chemotherapeutics, as well as taking part in the STARS program as Sandia National Lab.

Cameron has been accepted to a master's program here at NMT to continue his research in the Chemistry Department. Ultimately, he hopes to attend medical school.

Talysa Ogas Viera – Langmuir and Founders Award

Talysa earned her doctorate in biomedical technology. Her nomination for the Langmuir Award was supported by a host of faculty members in the chemistry department, and her nomination for the Founders Award was supported by faculty members from across campus.

She won the Langmuir Award for her paper titled, "DNA damage induced by KP372-1 hyper-activates PARP1 and enhances lethality of pancreatic cancer cells with PARP inhibition," which was published in the journal *Scientific Reports* from the Nature Publishing Group, along with her advisor Dr. Praveen Pratidar, who noted that this was not even part of her dissertation work.

This paper identifies a potent tumor-selective chemotherapeutic approach for pancreatic cancer treatment, and the project has resulted in an application for a patent. Dr. Pratidar said Talysa earned this award based on the quality and quantity of her work.

Talysa is a native of Los Lunas, New Mexico. She earned her bachelor's and master's degrees at New Mexico Tech. She returned after several years away, including two years teaching secondary school.

Talysa's nomination for the Founders Award highlighted her leadership and volunteer work. She did yeoman's work in the Writing Center to help her fellow graduate students polish their papers and improve their writing skills. She volunteered in the Center for Graduate Studies and won numerous awards in the Chemistry Department.

I would like to express sincere gratitude to everyone who supported us on this application."

The grant was awarded under the Department of Energy Funding Opportunity Announcement, DE-FOA-0001999. The title of the grant application is "San Juan Basin CarbonSAFE Phase III: Ensuring Safe Subsurface Storage of CO₂ in Saline Reservoirs."

Summary of the project

The overall objective of this project is to perform a comprehensive commercial-scale site characterization of a storage complex located in northwest New Mexico to accelerate the deployment of integrated carbon capture and storage (CCS) technology at the San Juan Generating Station (SJGS), a nearby 847 MW coal-fired electricity generation site. The data collected by the characterization and environmental analysis will be used to prepare, submit, and attain a Class VI permit (for construction) to inject and store at minimum 50 million tonnes of CO₂ at the site.

The project successfully kicked off October 1, 2020. The project team has delineated the stratigraphy within the storage complex in the San Juan Basin and currently identified three injection targets for long-term CO₂ storage [Figure 1]. These target formations include the Entrada formation as the main target, with Salt Wash Member of Morrison and Bluff Sandstone as secondary targets. The project has visited outcrops within the San Juan area that could be used as analogs to the Jurassic section that will be penetrated in the stratigraphic well. Figure 2 shows the section of the picture taken by the project team during the visit that shows the outcrops of Dakota, Morrison, Bluff, and Entrada formations. The project team has licensed a 100 square mile 3D seismic from ConocoPhillips at a cost of \$1.6 Million, which is currently utilized for stratigraphic and structural interpretations. The preliminary stratigraphic interpretation from the seismic is shown in Figure 3. The team is currently pursuing private land, with our industrial partner Enchant Energy, to drill the stratigraphic well with a spud date in late July this year.

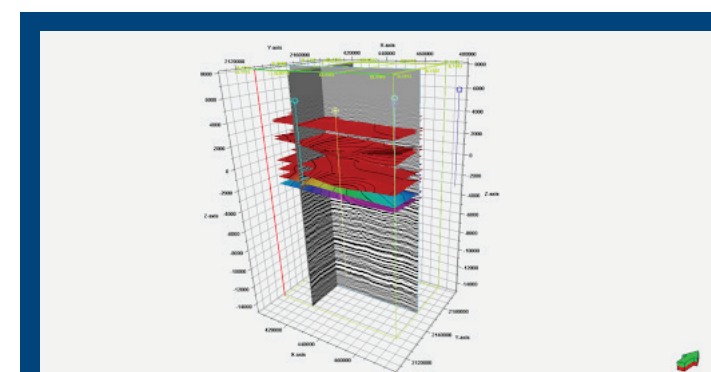


Figure 3- Preliminary horizons mapping. The unit of vertical axis is elevation in ft with respect to mean sea level.

NMT Awarded Federal Grant to Study Rare Earth Elements in Coal-Rich Areas

NMT was awarded a grant from the Department of Energy for studying rare earth elements (REE) in coal beds in northern New Mexico. The grant is for \$1,483,787 over two years, with Dr. Navid Mojtabai of the Mineral Engineering faculty serving as principal investigator. The two co-P.I.'s on the project are Dr. William Anmopah, scientist at the Petroleum Recovery Research Center, and Dr. Ginger McLemore, economic geologist at the N.M. Bureau of Geology who specializes in rare earth elements.

The project will involve more than 15 staff scientists and provide funding for three graduate students. About eight undergraduates will be employed and get hands-on research experience.

This funding will assist NMT researchers to support and train junior staff and students. NMT will be collaborating with the national laboratories and the Navajo Nation.

The field campaign will include two coal-rich regions: the San Juan Basin and the Raton Basin. This project is a collaboration between NMT, the two New Mexico national labs (Los Alamos and Sandia), San Juan College, and SonoAsh LLC.

The project aims to determine the rare earth elements and critical minerals resource potential in coal and associated stratigraphic units, including mine waste products, in the San Juan and Raton basins of northern New Mexico. The state has significant coal resources that are currently used to generate electricity.

REE are among many critical minerals (CM) identified by the federal government and are used in computers, batteries, electric vehicles, wind turbines, solar panels, and numerous other products.

This project has three main scientific goals:

- (1) Identify and quantify the distribution of REE and CM in coal beds and related stratigraphic units in the San Juan and Raton basins,
- (2) Identify and characterize the sources of REE and CM, and
- (3) Evaluate the basinal industry infrastructure and determine the economic viability of industrial upgrading in New Mexico.

Ideally, CM and REE could be recovered from coal before burning to make electricity in the power plants as well as recovering them both from the resulting ash and other waste products after burning coal.

LEVERAGING INNOVATION AND INVESTING IN THE FUTURE

New Mexico Tech Secures \$17.5 Million Grant for CO2 Storage

NMT research team will characterize geologic formation for CO2 capture in the Four Corners area

NMT recently was awarded a \$17.5 million grant from the U.S. Department of Energy to study carbon storage in a geological complex in northwest New Mexico.

The grant is part of the Carbon Storage Assurance Facility Enterprise, or CarbonSAFE, initiative. The work will complete the detailed site characterization and CO2 capture assessment needed to obtain permitting for a planned integrated carbon capture and storage program at the San Juan Generating Station, a nearby 847 megawatt coal-fired electricity generation plant. The project funding includes an additional \$4.5 million cost share.

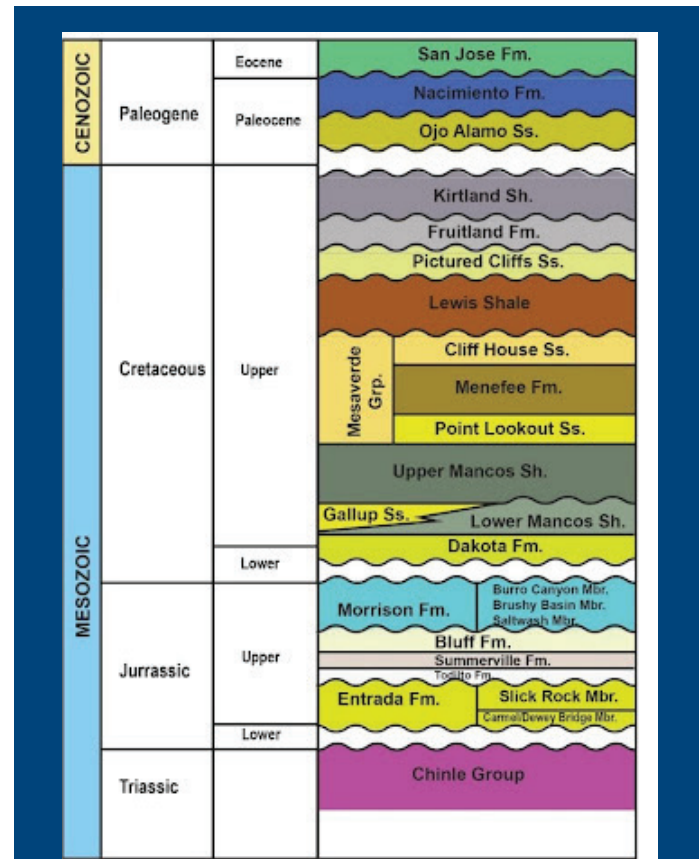


Figure 1 - Two type well logs showing the tops from the Eocene San Jose Formation to the Triassic Chinle Group. The wavy lines represent unconformities.

“The success of this application was largely dependent on past work and analyses performed at New Mexico Tech,” said Dr. Robert Balch, director of the Petroleum Recovery

Research Center (PRRC) at NMT. “This background allowed the project to start at Phase III, due to existing knowledge about the potential storage site.”



Figure 2 - View of Animas Mountain looking west

Balch is the project director and Dr. William Ampomah, research engineer and section head at the PRRC, is the project’s lead investigator. Balch said the project involves a New Mexico-centric team, including NMT, the Petroleum Recovery Research Center, the N.M. Bureau of Geology, and the two national labs in the state. He said the work builds on 17 years of previous carbon storage research performed by New Mexico Tech under numerous Department of Energy cooperative agreements.

The data and analyses produced under the agreement will be used to prepare, submit, and attain a permit from the Environmental Protection Agency to potentially construct a CO2 injection well that would allow for geologic sequestration of 50 million metric tons of CO2 at a site near the power plant. The CarbonSAFE program’s goal is to accelerate commercial-scale use of carbon capture and storage technology to reduce greenhouse gas emissions to the atmosphere from industrial and power generation sources such as this power plant.

“It is exciting for me personally and for the team to successfully secure this funding,” Dr. William Ampomah said. “It’s great news for the team to work and contribute to the sustainability of the San Juan Generating Station. This funding opportunity will assist researchers at New Mexico Tech to support staff and student research. The award was very competitive. It wouldn’t have been possible without the supporting letters we received from many local entities in the San Juan area and industrial partners such as Enchant Energy, Hilcorp Energy, and Robert L. Bayless, Producer LLC. As the lead principal investigator of the project,

ENSURING AND MEASURING STUDENT SUCCESS

New Mexico Tech achieved its highest second-year retention (81.2%) and third-year persistence (68.2%) rates in the university’s recent history in 2021.

In FY20, NMT invested \$3.9 million on student salaries from research funding alone.

Hands-on research for students is a key part of the NMT experience and gives our graduates the advantage of years of job experience before they graduate.

Tech graduates earn a median salary of \$65,800 upon graduation and \$124,500 after 10 years.

Office for Student Learning (OSL)

The Office for Student Learning is a large part of the success story for numerous students attending NMT. Its mission is clear:

- The Office for Student Learning is a nexus for student academic support initiatives and seeks to work with curricular and co-curricular programs to foster opportunities for student learning. The OSL provides a space and framework to develop community, foster collaboration, and pilot new ideas. This work is accomplished through a progressive and consistent assessment of student learning outcomes to ensure our work contributes to the advancement of our students and institution.

OSL programs are focused on building student success and teaching processes for understanding, confidence, and knowledge. “Everyone is a learner” is a phrase emphasized at the OSL. Learning processes for addressing academic development and mastery, development in sequence and practice to enter STEM fields as a learner and a researcher, as well as taking a student from secondary to tertiary education expectations and practices are central focuses of the OSL. Transition through these stages is critical for the success of NMT students. We are in the academic and professional business of creating “Eagles from Eaglets.” The results of this experience allows our alumni to fly high and perform well upon graduation.

The OSL is a part of the entire NMT academic ecosystem that focuses on student success. As such, we regularly provide assessment reports to the Office of Academic Affairs to ensure our programs are benefiting students and contributing to the mission and vision of NMT.

The OSL moved into the east side of the First Floor of Skeen Library in January of 2020. As the COVID-19 pandemic began in March of 2020, the OSL went through restructuring to be available to students online with three major programs: The Student Research Symposium, Tutorial Services, and Peer Mentors. As fall semester 2021 began, the OSL again provided face-to-face programming, as well as online programming.



OSL Tutoring

Summary

When the COVID-19 pandemic began, the OSL quickly adapted all services to meet the evolving needs of students. OSL tutoring changed to an online format utilizing Discord, a social platform popular with NMT students and recommended by OSL tutors. On Discord, students have the ability to message and speak with tutors directly. The OSL also started to use GoBoard, an interactive digital whiteboard equipped with video, screen-sharing, and STEM tools. The OSL continues to utilize Discord and GoBoard for tutoring, as well as WCONLINE, a respected tutor center management software for scheduling, record-keeping, and online consultations for students who prefer to plan their tutoring sessions in advance.

The OSL also partnered with NMT’s Math Department to offer extended tutoring for students with grade extensions over both winter and summer interim sessions.

NMT STUDENT SNAPSHOT

- Degree-seeking undergraduates: 1,201
 - Degree-seeking graduate students: 410
 - Total degree-seeking students: 1,611
 - Total enrollment: 1,734
 - 86.8% New Mexico residents
 - 71.9% majoring in engineering
 - Average GPA: 3.3
 - 74% GPAs of 3.0 and greater
- Undergraduate**
- 47.2% White, 40% Hispanic, 3.8% Native American
- Graduate**
- 46.8% White, 22.2% Hispanic, 2% Native American



Anticipating the 2021 fall semester, The Writing Center moved its location to the Skeen/OSL area and provides a central location for students to receive quality tutorial services in STEM and technical communication topics. The OSL is excited for this cooperative programing.

Anecdotes

Anthony Lavelle, sophomore/junior (expected graduate 2023) in materials engineering: "I really appreciated the OSL's help. The tutors always took time to answer every question I had and never talked down to me or spoke in a condescending manner. Once I figured out a concept, they patiently waited for me to learn how to do problems involving that concept myself."

Tutor Training

Tutors received online training endorsed by the College Reading and Learning Association (CRLA) and developed by Purdue University and Tutor Matching Service. New tutors also performed mock tutoring sessions with more experienced tutors. OSL staff conducted tutoring observations for all tutors and offered constructive feedback based on best practices and training standards.

Student Research Symposium

Summary

The Student Research Symposium (SRS) is held every spring semester and provides undergraduate and graduate students an opportunity to practice presenting their research prior to attending larger conferences and other research events.

The 10th Annual Student Research Symposium was held virtually from April 14-16, 2021, and featured over 500 participants and attendees. Over the course of the week, students participated in poster sessions, oral presentations,

a three-minute speech competition, and departmental showcases. More than half of the presenters had participated in the SRS in 2020 or before; this is a great testament to the quality of the research being conducted at NMT, students' dedication and persistence, and the OSL's vital role in student success.

Attendees included NMT students, faculty, staff, administrators, alumni, community members, and friends and family of the presenters.

The SRS is dedicated to both teaching the skills of presentation and promoting research skill sets. Students at all levels have the opportunity to participate in research and present in one or more of the forums to share the exciting projects on which they've been working. "Communicate to Educate" means to effectively communicate your project or research to educate those you are presenting to. This is the primary focus of the Student Research Symposium. The vision of "Communicating to Educate" and "Learning by Doing" are lifelong goals emphasized by the SRS.

Anecdotes

Melinda Stevens, NMT undergraduate in mechanical engineering, on how the SRS boosted her confidence: "What I gained the most from the SRS is being willing to speak up for myself, and go 'Hey, I can do this research as a freshman. I am engaged and fully want to do this,' and have the support of the OSL and [Skeen] Library to be able to go, 'Yeah, you can do this! We're going to give you a platform to [show off your research].'"

Peer Mentoring

Summary

During the 2020-2021 academic year, the Peer Mentor Program transitioned from a "Face to Face" program with incoming students to a Discord Platform that provided virtual men-

toring and interaction. This program was also used during the Summer of 2021 to facilitate interaction with new students as they integrated and engaged in learning at New Mexico Tech. Peer mentors come from the sophomore through senior year students. Peer mentors as a group represent differing academic majors and minors, are moving forward in their degree path and in research, and are representative of the student body of New Mexico Tech. Library/OSL staff and guest speakers from around the university instruct and engage mentors in NMT processes of registration, support services, student affairs, and listening skills. Peer mentors practice facilitating NMT processes in mock sessions with one another, and they are an essential group to welcome and help incoming students become engaged and active at New Mexico Tech.

The OSL also hosts weekly virtual events called Tech Spotlight and Ask Tech Anything in order to familiarize incoming and first year students with faculty and staff. Tech Spotlight showcases the work of faculty and staff and their respective departments. Ask Tech Anything is a text chat Q&A session conducted via Discord for new and incoming NMT students.

The Peer Mentor Center employs approximately 25 student mentors to be in contact with incoming students. All students are invited to participate in the program, and upon entering, are assigned to a mentor cohort group (For FY2022 the cohort groups are all named with a mineral crystal). During the summer and throughout the academic year, mentors will make contact through interaction on the Discord Server, emails and Direct Messaging, Virtual, and "Face to Face" programs and meeting times.

Anecdotes

Justin Barker, mentor: "I have been a peer mentor for about a year now. I came to the program because I was a mentee in the program previously. During my time, I spent two semesters with the 20/21 freshman hosting events and helping host events, my favorite of which was definitely Ask Tech Anything. What I love most about being a peer mentor is meeting new people, learning new things, and helping freshmen get used to Tech. I had a few rough patches when it came to understanding what to do and how to do it, so I like to help the new students as much as I can."

Class of 2021 Career Outcomes and Facts



Data is collected annually via the Post Graduate Survey administered by NMT Career Services Office