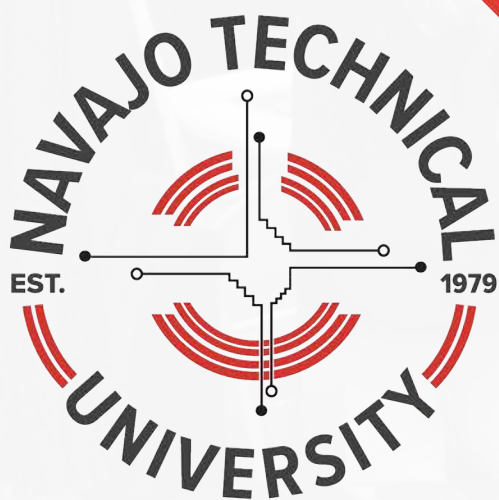


IT BEGINS FROM
WITHIN

2022
**ANNUAL
REPORT**



NITSÁHÁKEES | NÁHATÁ | IINÁ | SIIH HASIN



*“Navajo Technical University honors
Diné Culture and Language, while
educating for the future.”*

NAVAJOTECH.EDU

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**NTU IS ACCREDITED WITH THE
HIGHER LEARNING COMMISSION**

- 10 Year Approval 2018 -

SPECIAL PROGRAM ACCREDITATIONS WITH:



Veterinary Technology



American Culinary Federation
The Standard of Excellence for Chefs

Commercial Baking, Culinary Arts



Engineering
Accreditation
Commission

Electrical Engineering, Industrial Engineering



Carpentry, Construction Technology,
Electrical Trades, and Welding

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NTU MISSION, VISION, AND PHILOSOPHY



The NTU core values are in addition to its mission, vision, and philosophy statements, and help guide the university's day-to-day operations. They apply to students, faculty, staff, and the board of regents, and help us achieve our intended goals.

MISSION STATEMENT



Navajo Technical University honors Diné Culture and Language, while educating for the future

VISION



Navajo Technical University provides an excellent educational experience in a supportive, culturally diverse environment, enabling all community members to grow intellectually, culturally, and economically.

PHILOSOPHY



Through the teachings of Nitsahakees (thinking), Nahata (planning), lina (implementing), and Siih Hasin (reflection), students acquire quality education in diverse fields, while preserving cultural quality education in diverse fields, while preserving cultural values and gaining economic opportunities.

Board of Regents

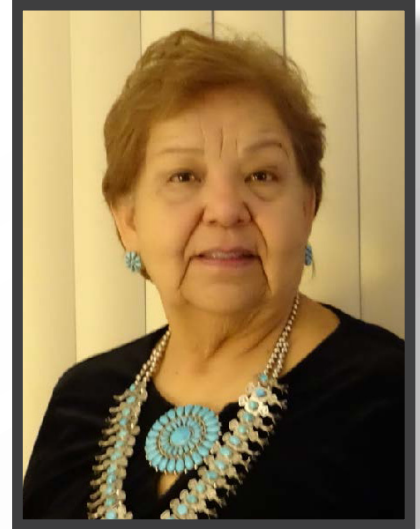
NAVAJO TECHNICAL UNIVERSITY - 2022



Tom Platero
Board Chairperson
Fort Defiance Agency



Dr. Delores Greyeyes
Board Vice Chairperson
Western Agency



Roselyn John
Board Member
Eastern Agency



Dr. Carolyn Morris
Board Member
Shiprock Agency



Gloria Grant
Board Member
Chinle Agency



Jasmine Charley
Student Senate President

President, Provost, and VP

NAVAJO TECHNICAL UNIVERSITY - 2022



Elmer J. Guy, Ph.D

NTU President



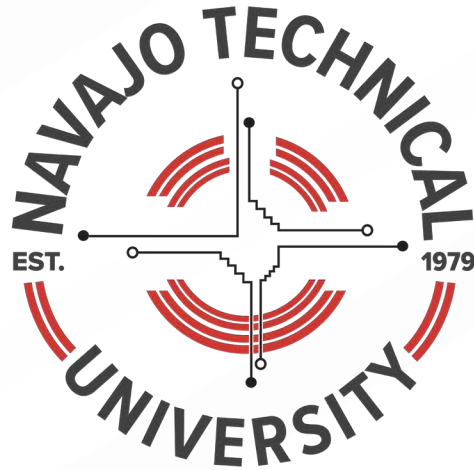
Dr. Colleen Bowman

NTU Provost



Jason Arviso

Vice President of Operations



STATEMENT FROM THE **PRESIDENT**

“This was a challenging year for Navajo Technical University (NTU). Education became a never-ending challenge that forced all of us to not only dig deep into our resilience, but also to stir up the creativity inside us in order to resolve the dilemmas we faced and take advantage of the opportunities that became possible.

What I am most proud about this year is that NTUs students, student families, faculty, staff, and administrators all pulled together to face dilemmas presented by the pandemic head-on and thrive inside of the challenges we were all facing. Indigenous higher education can be a powerful force that finds the endless possibilities that we, at NTU, see in all the classrooms, projects, research, and daily activities with which we are involved. Those possibilities take many forms. For instance, they exist in a hot spot put up by our IT folks, the application to Harvard University for graduate school by one of our biology graduates, hybrid in-class, virtual education lessons developed by overworked faculty, or virtual counseling sessions by our counseling staff. So many of our trades, STEM, general education, and creative faculty come up with projects to keep students engaged and learning and becoming better able to not only take care of their families, but to serve the Navajo or Zuni communities of this area. This learn-by-doing approach helps define the dynamism that is Navajo Technical University. It also is engaged with the heart of the Diné Philosophy of Education that gives all of us the spirit of what this university is all about.

We have met the pandemic challenge and turned it into a year of endless possibilities that has enriched the lives of our students, our faculty, our staff, the families of our students, and the Navajo and Zuni Nations themselves. The truth is that despite all the challenges we have faced, we have ended this year stronger and more dynamic as an institution of higher learning than we were a year ago. This has been an extraordinary year.”

Elmer J. Guy, Ph.D.
NTU PRESIDENT

History / Persistence / Vision

NAVAJO TECHNICAL UNIVERSITY - 2022



Navajo Technical University has had several identities during its history. It started as Navajo Skills Center in 1979, focusing on vocational education programs associated with the construction trades or office work. Then it became the Crownpoint Institute of Technology (CIT) in 1985 to offer quality instruction in technical and vocational fields, concentrating at first on Certificates and then, shortly afterward, on associate of applied science degrees. In 2002 CIT achieved Candidacy for Accreditation status with the Higher Learning Commission. Then it became fully accredited on October 17, 2005, reflecting the growth in both the number of associate degree programs and certificates in place at that time. Then, in 2006 NTU established the first instructional site for the college in Chinle, Arizona. This development was one of the reasons behind yet another name change, in 2006, to Navajo Technical College (NTC). NTC then launched its first baccalaureate degrees in 2010 in Information Technology, Digital Technology, and New Media. This accomplishment was followed up by the accreditation of NTU's first Masters' degree in Diné Language, Culture, and Leadership in 2013. In that same year, the college became Navajo Technical University.

NTU's history shows that from the very beginning, the various boards and staffs of each iteration of the college, then university, two qualities were ingrained into its growth: economic and social development for Navajo people. Since the Navajo Skills Center was founded, there were not many jobs available to the Navajo people on the Navajo Reservation. Our Navajo Nation leaders thought that they could improve that situation by building an institution that provided skills, documentation, and training that qualified people for the jobs that existed on and off the Reservation. When that training was not enough to help enough individuals improve their position, CIT was established with the idea that certificates and even associate degrees could help more Navajos achieve careers that would benefit their families and the Navajo people. As CIT developed, it pursued the possibility of becoming a baccalaureate degree-granting institution that could help address individual career aspirations. The aspirations of the Navajo government for economic and social development became the obvious next step, which was then taken, resulting in naming technology institute NTC. Following this path led directly to achieving the first accredited graduate degree and the renaming to Navajo Technical University.

Also, integrated into this history is the power of the vision that is built into NTU. As the institution developed, the various leaders saw possibilities for development that would benefit students and the Navajo Nation as a whole. Over time a skills training center became a research university with aspirations for capturing intellectual property that can provide long-term social and economic benefits that will help solve some of the challenges that have faced the Navajo people from the time after the Long Walk. Throughout its history, NTU has seen opportunities on the horizon and moved to turn those opportunities into programs, projects, and degrees that help individuals, families, and the entire nation.

5 LOCATIONS ACROSS THE NAVAJO NATION



New Mexico: *Crownpoint, Kirtland, and Zuni.*
Arizona: *Chinle, Teec Nos Pos.*

The Long-Term Vision and Application for Accreditation of a PhD Degree in Diné Culture and Language Sustainability



Brenda Yazzie //////////////////////////////////////
Master of Arts in Dine Culture, Language, and Leadership Graduate

Navajo Technical University has been working toward becoming a significant research university since 2011. NTU first became a university recognized by the Higher Learning Commission (HLC), which provides its accreditation, in 2013, but that recognition came after two years of planning and putting a variety of academic and administrative programs in place. The value in becoming a significant research university, especially for the Navajo Nation, is that studies have shown economic success and diversification are closely correlated with the kind and size of the research university area. There are a lot of reasons for this. The workforce needs in business, industry, government, and the non-profit sectors primarily are centered in a broad range of associate or baccalaureate degree disciplines. Such degrees are central to further these economic sectors as well as the futures of students and families. NTU's strong undergraduate certificates and degrees are a foundation that can help with the efforts of the Navajo administration and legislature to improve the lives of all Navajo.

However, major research universities not only attract larger amounts of research dollars through grants and partnerships with both governmental and private sector organizations, but they also create intellectual property (patents, copyrights, trademarks) that leads to new businesses and entrepreneurial activity and makes available a high level, creative workforce attractive to the private sector when they decide to locate a job-generating business in a particular geographic location.

NTU has come a long way since Elmer Guy first articulated his vision for a research university. New degrees, often in partnership with the private sector or the Navajo Nation, are accredited every year. Several students have already earned their master's degree in Diné Culture, Language, and Leadership. Next year the first graduation for those completing the requirement for a Master of Science in Management Information Systems degree will be held. There is also an impressive number of research efforts being pursued by undergraduate and graduate students and faculty at NTU, evidenced partially by the growing list of peer reviewed publications. One of the most significant accomplishments of 2022 has been the work that has gone into the effort to accredit NTU's first PhD degree in Diné Culture and Language Sustainability. The accreditor team from the HLC has visited the campus and issued its report to its Board. NTU is waiting for final action from the HLC Board to see if its efforts, that have over a decade of work, have succeeded.

Student Competitions



NTU Students Shiprock Parade
Shiprock, NM

////////////////////////////////////
One of the ways to measure how successful a university is at serving its students is by seeing how its student body does in competitions either internally or externally. As has been true for decades, NTU's students rock! As in other years, 2022 saw students achieve success after success in a wide variety of areas and competitions.

1. NTU Student Research Competition

On March 9, 2022, the university held its 9th Annual Research Day competition for NTU students from various disciplines of study to showcase their research projects. The event awarded cash prizes to the top three research projects submitted and displayed for visitors. NTU students, **Layla James and Jesslyn Chief**, were winners for their research, "Encapsulation of Native American Plants for Therapeutics". Their analysis verified the correlation of native plant species and its effects in various forms to treat certain health disorders.

"The research competitions are designed to showcase students' abilities to convey the information they have learned and then apply it to situations in our environment. Competitions also prepare them for professional opportunities," Dean of Undergraduate Studies. Dr. Casmir Agbaraji said, discussing the event. *"This year, the research competitions were held only for our NTU students, and they all did an outstanding job with their presentations,"*

Research presentations receiving honors at the event were 2nd place winners: **Malynndra Tom, Kirby Morris, and Darlene Wilson**, for their project, "A Parallel of Traditional uses of Yucca with Modern Science". Their focus was on the medicinal use of the yucca plant and its correlation with modern science. The plant has Navajo traditional and cultural components used for hundreds of years, and the students were able to better understand those components scientifically.

The research project that earned the third-place award was by **Randy Largo, Chase Bebo, and Phaizon Osborne** for their analysis on climate change through impacts on Pinon Trees on the Navajo Nation. Their study, "Research Based Climate Change Impact Assessment on Pinyon Pine for Black Mesa", collected data such as trunk girth, tree height, and cone collection for seeds from a location called Black Mesa, Arizona to support the Pinyon Pine Climate Change Research team.



9th Annual Research Day
NTU students being awarded

"They all did an outstanding job with their presentations"
- Dr. Casmir Agbaraji

2. Navajo Technical University (American Indigenous Business Leaders (AIBL) Chapter



On July 15, 2022, the Navajo Technical University (American Indigenous Business Leaders (AIBL) Chapter won First Place in the Chapter of the Year - Tribal College category. The AIBL Chapter of the Year Competition made history on July 15 at the Aqua Caliente Resort Rancho Mirage, Mirage, CA, with the National American Indigenous Business Leadership Conference. The competition was divided into three divisions: High school, Tribal College, and University.

Each Chapter from these respective divisions presented an: introduction, past and present activities, the leadership of movements, integration of American Indigenous Culture, community service projects, fundraising efforts, and overall presentation skills. AIBL Chapters did a presentation in a video format where they had to include the Chapter name, current Chapter officers, the name and title of each member, and their current Chapter advisor for a total of ten minutes. Students that attend these events also listen and learn from today's business leaders who provide tips and help them network in workshops.

The NTU AIBL Chapter won one thousand dollars that they can use for club activities and strengthening the accounting program. NTU AIBL Chapter members that attended the event were Frederika Thomas, President; Romulus Cordova, Vice President; Christopher Beyal, Secretary; Devin T. Chee, Treasurer; Larris Enrico, Coordinator; and Kaitlin Freeland, Student Senate Representative.

3. New Mexico State SkillsUSA



"SkillsUSA helps each student excel. The organization provides educational programs, events, and competitions that support career and technical education in the nation's classrooms. I love being involved with the students and seeing their transformation into professionals as they engage in SkillsUSA events and activities," Julie Bales, coordinator for the NTU SkillsUSA Team, said.

- NTU gold medalists were Chris Wesley for Automotive Service Technology; Araya Yazzie for Carpentry; Vivianne Joe for Culinary Arts; Tyson Tsoisie for Electrical Construction Wiring; and Antonio Platero for Job Skill Demo A.
- NTU silver medalists were Kelly Bitsoi for Culinary Arts, Nilsson Wood for Electrical Construction Wiring, Angela Shepherd for Job Skills Demo A.
- The NTU bronze medalists were Rozanne Manuelito for Related Technical Math and the team of Kanisha Faber, Marcus Burbank, and Ashton Jones for Welding Fabrication.

For the National SkillsUSA, NTU had 10 top 10 finishes: Job Skills Demo A (culinary student), Auto Service Technology.

4. America Indian Science and Engineering Society (AISES)

A Biology major student, Chelsie Whitwater, won the best oral presentation prize at the national AISES conference, which was attended by the biology faculty.



5. NTU's Environmental Science program hosted the 1st Undergraduate Research Showcase Event

Environmental Science program hosted the 1st Undergraduate Research Showcase Event on October 21, 2022, at the NTU Hospitality Center. During the summer of 2022 Environmental Science students went to different places throughout the United States to do paid internships. Their work was universally praised by their supervisors at each site where they spent the summer. At showcase event on campus, they presented their research in front of the NTU community. This event was sponsored by several local organizations. The top three presenters were selected by the panel of judges, and they received certificate, prizes, and cash awards. Chase Bebo was awarded the first place while Kirby Morris and Malynndra Tome secured the second and third place respectively.



6. Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)



Jonathan Chinana, and Justin Platero won research awards at the SACNAS National Conference held in San Juan, Puerto Rico, on October 27 - 29, 2022.

SKYHAWK HIGHLIGHT

NTU Student Recognized in Creative Writing Competition



Mar 16 | Tribal College Journal (TCJ) notified our very own Navajo Technical University (NTU) creative writing student Ronnie Largo that his entry entitled "Poetry" was selected as a winner of the 2022 TCJ student Creative Writing competition. As a result, he will be featured in the 2022 spring edition of TCJ publication and on its website at www.tcjstudent.org.

An Expanding Athletic Program

To build a successful university, one important element is a robust athletic program. NTU built its Wellness Center with a gymnasium in 2012. At that time the only competitive athletic program was in cross country, although several intramural programs were in place. Since then, archery and rodeo have been important parts of the competitive athletic mix. This year has seen NTU's first conference men's basketball team and is planning to introduce competitive cycling in the spring. On next year's agenda is a plan to introduce women's basketball to the campus in Crownpoint.

Basketball

The men's basketball team won four games and lost nine during its inaugural year. The team is improving. The team will have more games in the spring 2023. Coach Floco is recruiting student athletes for NTU. NTU will add women Basketball this Spring 2023. The coach is recurring this fall 2022 and spring 2023.



Rodeo

The Rodeo team has been doing well for a number of years now. The men's team this year is #4 in the Grand Canyon standings. Hiyo Yazzie is leading the region in the men's all around. Hiyo Yazzie is 3rd in Tie Down, 1st in Steer Wrestling, 4th in Team Roping. Mathew Jodie is 6th in Steer Wrestling. Mckayla Jodie is 12th in Break Away. The rodeo team has 6 more rodeos in the Spring 2023. Coach Pino is getting her team ready, and she is recruiting additional team members.



Archery

The archery team is competing in the USA Archery Conference and getting ready for the indoor season that starts in January 2023. Coach Martin is getting his team ready.



Cycling

Planning for a cycling team is complete and the team is getting prepared for the spring 2023 season. Coach AJ Murphy is recruiting.



Cross Country



The Cross-Country team is getting prepared for Spring 2023 after a successful competitive year in 2022. Coach Lee is recruiting runners.

SKYHAWK HIGHLIGHT

Oct. 11 | NTU held a groundbreaking ceremony in Chinle, Arizona for its new environmental lab after receiving \$4 million delivered by the \$18 billion 2023 Fiscal Year budget signed by Arizona Gov. Doug Ducey.



NTU receives \$4 mil for Environmental lab

NTU Hosts 26th Annual Conference of the Foundations for Endangered Languages

NTU hosted the 26th Annual Conference of the Foundation for Endangered Languages in Crownpoint and Albuquerque, November 2-4, 2022. This international conference brings together language workers, educators, and activists from around the world. Local organizers were Dr. Siri Tuttle and Dean Wafa Hozien. Twenty-two papers were presented by in-person and virtual attendees. The conference was sponsored by Navajo Technical University, the University of New Mexico, EPSCOR New Mexico, and the Foundation for Endangered Languages.



NTU Hogan
Crownpoint, NM

Culinary Arts Earns Honors from the American Culinary Federation (ACF)

The Culinary Arts and Baking programs Culinary Arts received Exemplary Status with the American Culinary Federation. This is the way the ACF recognizes the strongest college programs in the United States. NTU also was selected to demonstrate Fry bread and to tell the Navajo Nations story at the national convention in New Orleans.



NTU Culinary Arts Bldg.
Crownpoint, NM

NTU NAVAJO NATION PARADE - SKYHAWK HIGHLIGHT

Sept. 10 | NTU participated in the Navajo Nation parade 2022, there were many floats from local businesses, schools, and groups in and around the Navajo Nation. Our mascot, Sammy the Skyhawk, even appeared and greeted the people. We look forward to next year. Seeing the Navajo Nation enjoying itself was great. Also, NTU would like to show our appreciation to those who participated and to all who helped build the NTU float for the Navajo Nation Fair this past weekend; good job, and thank you for supporting your local University.



Community Outreach

One of the requirements for all HLC accredited colleges and universities is to provide community outreach. Tribal colleges and universities were founded on the idea that they would serve American Indian communities much more intensively than was usual in mainstream institutions of higher learning. NTU has a long history of providing such outreach.

Heartbeat Music Project



The **Heartbeat Music Project (HMP)** was founded in 2016 by violinist Ariel Horowitz, and now operates under the leadership of Executive Director Sharon Nelson. HMP offers tuition-free music education to K-12 Diné youth, in addition to providing food, transportation, and instruments to all students. Since 2019, HMP also offers Diné Cultural and Language studies, taught by Nelson. HMP strives to provide music education within an Indigenous system of learning, demonstrating to students that music is a way to acknowledge, strengthen, and celebrate their identities.

Now in its sixth year of operations, HMP serves nearly one hundred Diné youth each year within the Crownpoint, NM area. These students enroll in a two-week Summer Academy and one-week Winter Workshop, during which they receive private lessons and perform in small and large ensembles. In between these in-person sessions, students can enroll in the Virtual Lessons Program, which provides students with weekly online lessons. For students living closer to urban areas, HMP will enroll students in the Community Lessons Program, through which they relate to in-person teachers.

World Indigenous Peoples Conference on Education

July 14th, 2022 Dr. Elmer Guy, President, Navajo Technical University, USA and Co-chair, World Indigenous Nations Higher Education Consortium was a Keynote speaker for the 2022 World Indigenous Peoples Conference on Education (WIPCE). WIPCE presenters are community and political leaders and activists in Australia and internationally including the Uluru Statement from the Heart, United Nations Declaration on the Rights of Indigenous Peoples, and leading Indigenous and education movements across the world.

WIPCE draws Indigenous representatives from across the globe to share successes and strategies for culturally grounded education. WIPCE conferences attract Indigenous education experts, practitioners, scholars, students and communities. As a result, WIPCE is the largest and most diverse Indigenous education forum in the world.



Land Grant and Veterinary Teaching Hospital Community Service

NTU's Veterinary Teaching Hospital not only provides a laboratory important to the education of Veterinary Technician students, but it also provides veterinary services to a broad spectrum of people who bring cows, horses, dogs, cats, and other animals to the hospital for treatment. These services are only a few of the ones NTU's Land Grant department provides to Navajo communities every year.

A list of the ones provided this year follows:

- USDA Safeguarding Natural Heritage Youth Agriculture Camp for jr high and high school students.
- Cattle Ranch Management Youth Program for jr high and high school students.
- Newcomb High School February Ag Education Program (learned to make chicken houses, etc.).
- Newcomb High School March Ag Education Program.
- Newcomb High School April Ag Education Program.
- Newcomb High School May Ag Education Program.
- Over 2,000 small ruminants served (over 60 sheep producers in Eastern agency) during July herd health with the help of 6 CSU Veterinary Students, and NM State Vet Office staff.
- NTU Small Ruminant Vaccination/Deworm experiential learning for vet tech students.
- NTU Ram Genetic Improvement Program & Education.
- NTU USDA APHIS Internship Program for SIPI and NTU students.
- 3 students completed USDA Animal and Plant Health Inspection Service Wildlife Service and Veterinary Service summer internships (2 NTU Animal science/Biology (Kentucky/Tennessee) & 1 SIPI natural resource student (Utah)).
- USDA Student Internship Presentations & Recruitment conference.
- NTU Sheep Shearing School for sheep producers.
- Beef Quality Assurance Certification Program for cattle ranchers.
- Youth Beef Quality Assurance Certification program for youth ranchers.
- NTU Spring Crownpoint Community Equine Veterinary Services & experiential Education (2 CSU Vet Students assisted along with vet tech students).
- NTU Spring Chinle Community Equine Veterinary Services & experiential Education (2 CSU Vet students assisted along with vet tech students).
- NTU USDA Forest Service Wild Horse/Burro program February Bloomfield Community Equine Veterinary Services & experiential Education for Vet tech students.
- NTU USDA Forest Service Wild Horse/Burro program March Bloomfield Community Equine Veterinary Services & experiential Education for Vet tech students.
- NTU USDA Forest Service Wild Horse/Burro program April Bloomfield Community Equine Veterinary Services & experiential Education for Vet tech students.
- Spring Planting workshop: Fruit Tree Care & Garden Prep for Navajo Nation members.
- Spring Planting workshop: Lasagna Beds & Gardening Planning for Navajo Nation members.
- Spring Planting workshop: Soil Prep & Composting for Navajo Nation members.
- Spring Planting workshop: Cold Weather Crops for Navajo Nation members.
- Spring Planting workshop: Greenhouse Planting & Seed Starting for Navajo Nation members.
- Spring Planting workshop: Irrigation Planning & Rainwater Harvesting for Navajo Nation members.
- Spring Planting workshop: Seed Selection & Seed Saving for Navajo Nation members.
- Spring Planting workshop: Flowers, container gardening & pollinators for Navajo Nation members.
- Spring Planting workshop: Native Plants & Herbs- identification & use for Navajo Nation members.
- Spring Planting workshop: Canning & dehydration of garden produce for Navajo Nation members.
- Spring Planting workshop: Transplanting- from container to ground for Navajo Nation members.
- Spring Planting workshop: Harvesting your crops for Navajo Nation members.
- Fall planting workshop- Frost Protection & Cold Weather Strategies for Navajo Nation members.
- Fall planting workshop- Garden Troubleshooting & Lessons Learned for Navajo Nation members.
- Fall planting workshop- Preserving the Harvest: Hands-On for Navajo Nation members.
- Fall planting workshop- Preserving the Harvest: Hands-On for Navajo Nation members.
- Fall planting workshop- Seed Saving: Corn, Squash & Other Favorites for Navajo Nation members.
- Fall planting workshop- Building Soil & Planning for the Next Growing Season for Navajo Nation members.

Program Reports

On November 17, 2022, a biology symposium was organized at the NTU Hospitality Center. Highlights involved a debate on “Should we document indigenous medical plant virtues?”. Debate was moderated by the President of Student Senate, Jasmine Charley, while Dr Palmer Netongo set the stage with a story from the Navajo Nation and ran the polls before and after the debate. Debating in favor were Zabari-Obyoni Bell, Michael Nelwood, and Brandon James, and Debating against were Robinson Tom, Liana Shortly, and Keanu Simpson. Judges were Sharon Nelson, Dr Irene Ane Anyangwe and Jerlynn Henry. The biology second graduate, Breanna Thompson, now a graduate student in microbiology at Arizona State University (ASU) served as the keynote speaker.

Counseling Seminar

During the week of October 24, Dr. Dekelaita-Mullet co-presented a seminar with Dr. Stomp on the Psychology of Gambling Addiction, funded by Dr. Stomp’s grant from the American Indian College Fund. The two professors have co-presented the seminar in the past; it includes a casino demonstration, and it has been highly successful and engaging for students.

Industrial Engineering Program Report - NASA Visit



(L-R) Brady Kimbrel, NASA Marshall Space Flight Center; Lisa Winingar, NASA Armstrong Flight Research center; Dr. Elmey Guy, Navajo Tech President, Becky Flick, NASA Armstrong Flight Research center; Dr. Monsuru Ramoni, PI, NASA MUREP-NAMER Grant.

On March 23-24, 2022, the NASA MUREP Institutional Research Opportunity (MIRO) Team visited Navajo Technical University (NTU). While here, they had the chance to meet with President Dr. Guy, Provost Dr. Colleen Bowman, and Associate Professor Monsuru Ramoni, Ph.D., for an on-site review of NTU Institutional research building progress and help strengthen NASA partnership for future opportunities. In 2019, NASA MIRO awarded NTU a \$3 million cooperative agreement for the Navajo Tech Additive Manufacturing Education and Research (NAMER) project headed by Dr. Ramoni.



SKYHAWK HIGHLIGHT

Certified Nursing Assistant Certificate

Latanya Cadman and Cassandra Begaye demonstrated an occupied linen change and denture oral care to some patients here at Navajo Technical University. Cassandra and Latanya graduated with their Certified Nursing Assistant Certificate this past 2022 Fall Graduation.



Teaching of Dual Credit-Engineering at Gallup McKinley County School

Associate Professor Monsuru Ramoni and his staff Calsey Nez taught ENGR 103 - Introduction to Engineering - Spring 2022 and Fall 2022 - ENGR 130 Engineering Graphics. The students are taught 3-D solid modeling, assembly structures, bill of materials, 3D Printing, assembly of robotic vehicles, rapid research, technical reports, and presentations. Forty (40) high school students participated in dual-credit engineering to increase NTU engineering enrolment.



Student Internships



Industrial engineering program employed 16 NTU students for 2022 internship at NASA centers- Glenn Research center, Marshall Space Flight Center and NTU Center for Advanced Manufacturing (CAM) in the area of engineering design, 3D-Printing, and metal additive manufacturing and business procurement. The program also sponsored one NTU student, Nylana Murphy, for a 16-week internship (fall 2022) at Marshall Space Flight Center.

SKYHAWK HIGHLIGHT

Welding Technology Program

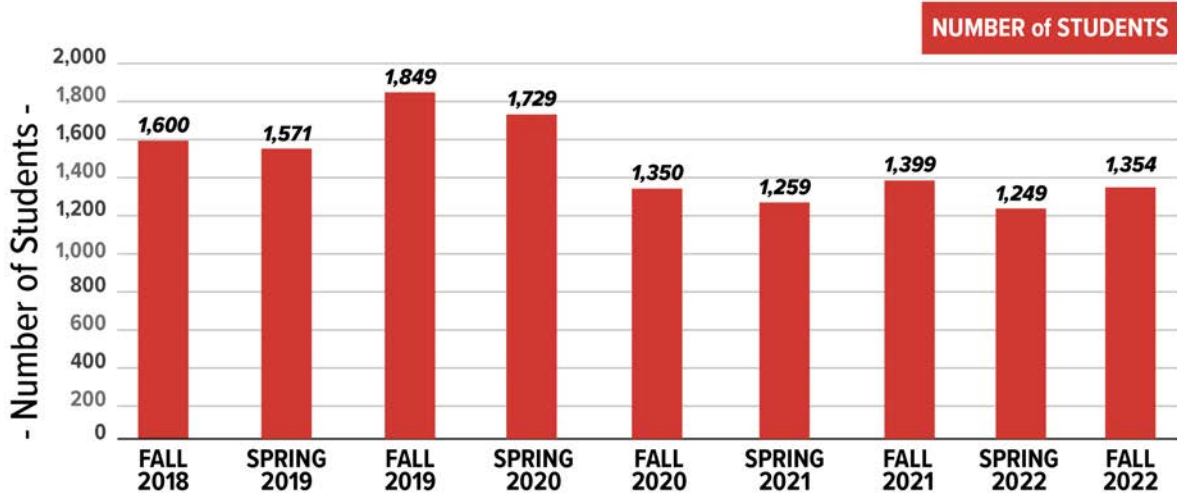
Navajo Tech Students in Welding get to experience hands-on training with state-of-the-art welding and safety equipment. Learning about oxygen and acetylene welding and cutting.



Statistical Analysis of 2022

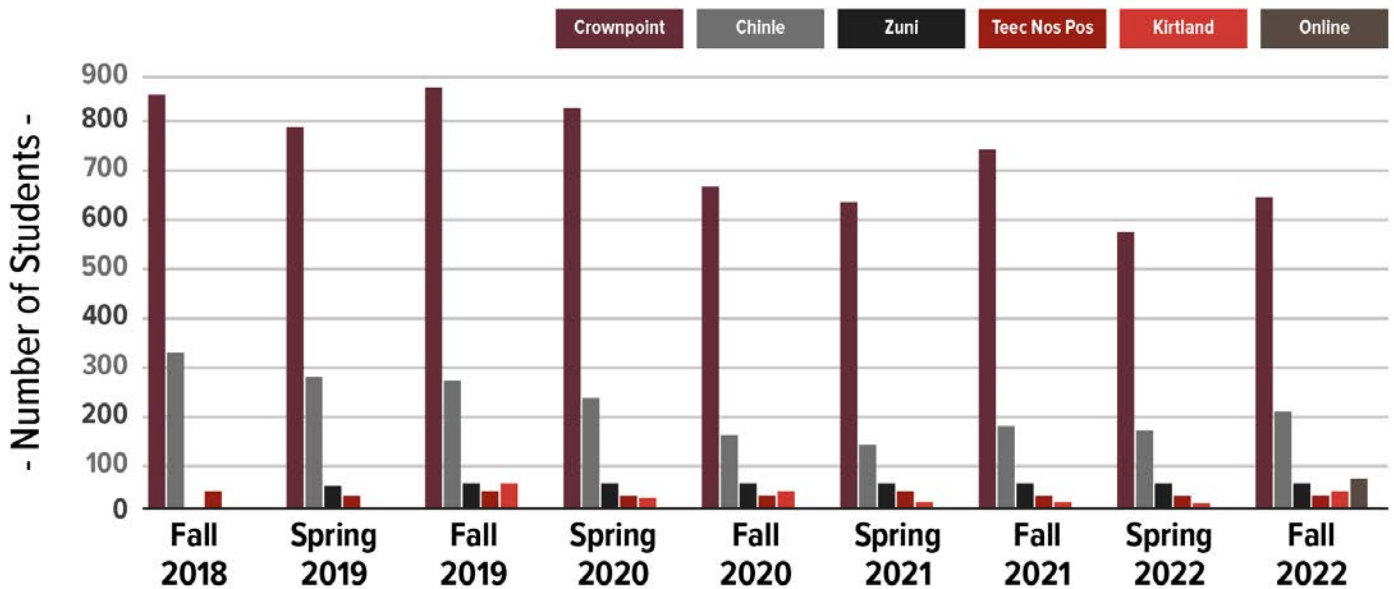
Since the pandemic, when a fall in enrollment was experienced, the enrollment has held roughly steady.

NAVAJO TECHNICAL UNIVERSITY Enrollment Trend



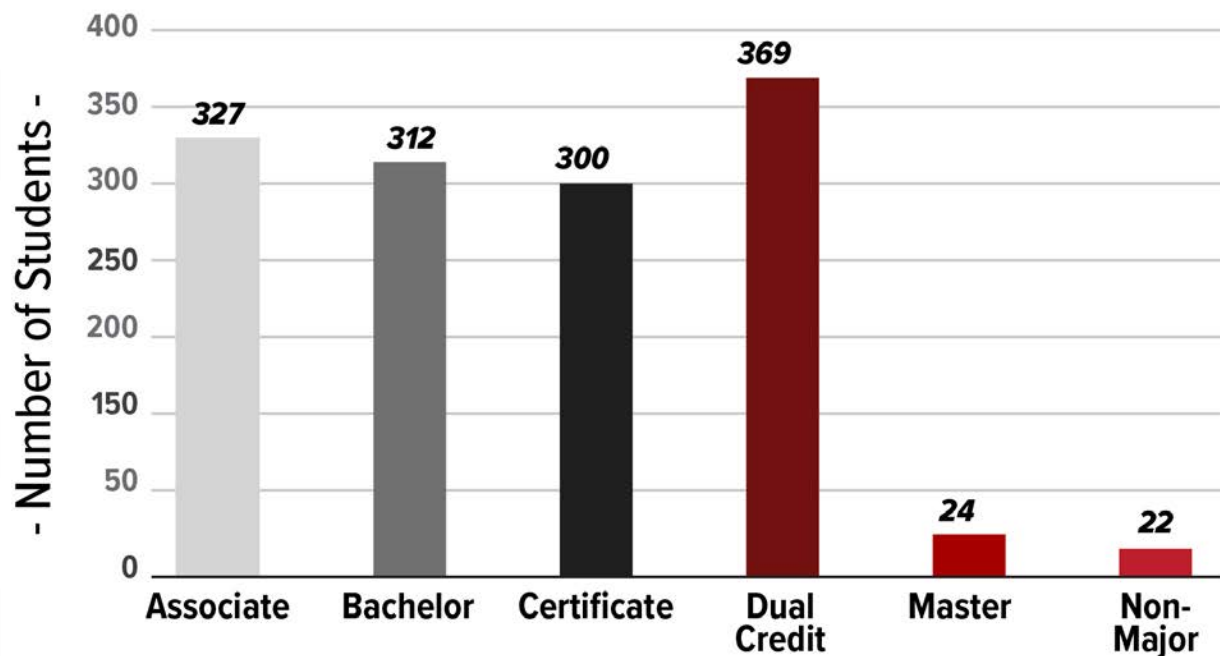
Analyzing enrollment per instructional site, Crownpoint's fall to fall enrollment fell. Chinle's fall to fall enrollment rose. Zuni is growing slightly while the other enrollments are still minimal. Fall 2020 is the first semester where online enrollment is being tracked separately from instructional sites. Online enrollment for Fall 2020 was slightly better than that for Zuni.

FALL 2022 Enrollment Per Instructional Site



FALL 2022

Enrollment by Degree Level



Dual credit enrollments are still a significant part of the total enrollment. However, both baccalaureate and master's degree enrollments continue becoming an increasing part of the total enrollment. Certificate enrollment used to be the predominant form of enrollment at NTU. That is no longer the case, although both certificate and associate degree enrollments provide the first steps on the career ladders constructed throughout the university's curriculum.

FALL 2022

Gender Enrollment

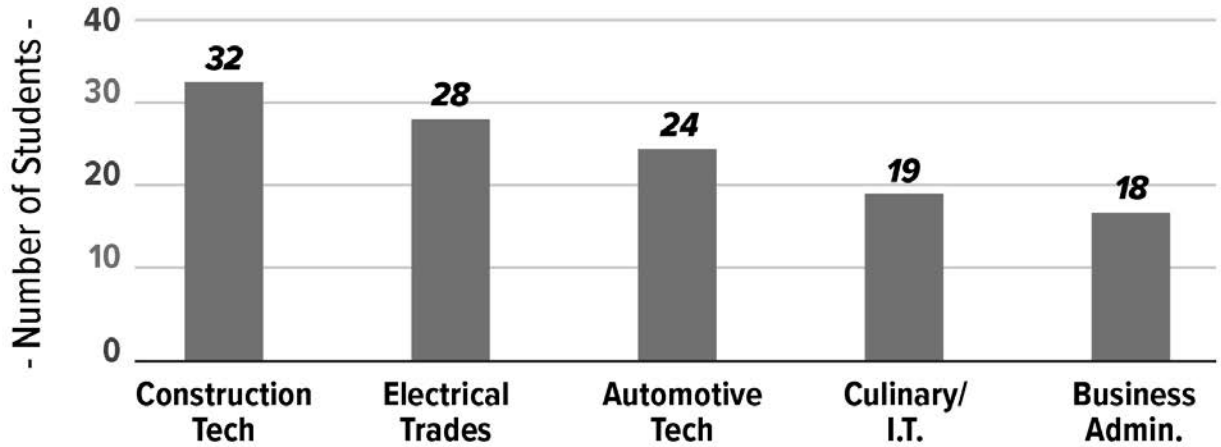


Male enrollment is still lagging female enrollment, which has been true for several years now, although, earlier in its history when Crownpoint Institute of Technology offered only certificate/associate of applied science programs, male enrollment was larger percentage of the total enrollment. An analysis of the most popular degree programs for males vs females shows that males still seem to prefer courses that lead directly to jobs, although electrical trades and culinary arts can be stepping stones to careers requiring a baccalaureate degree. Both males and females provide substantial enrollments in Business Administration, which requires a baccalaureate degree.

“Enrollment provides the first steps on the career ladders”

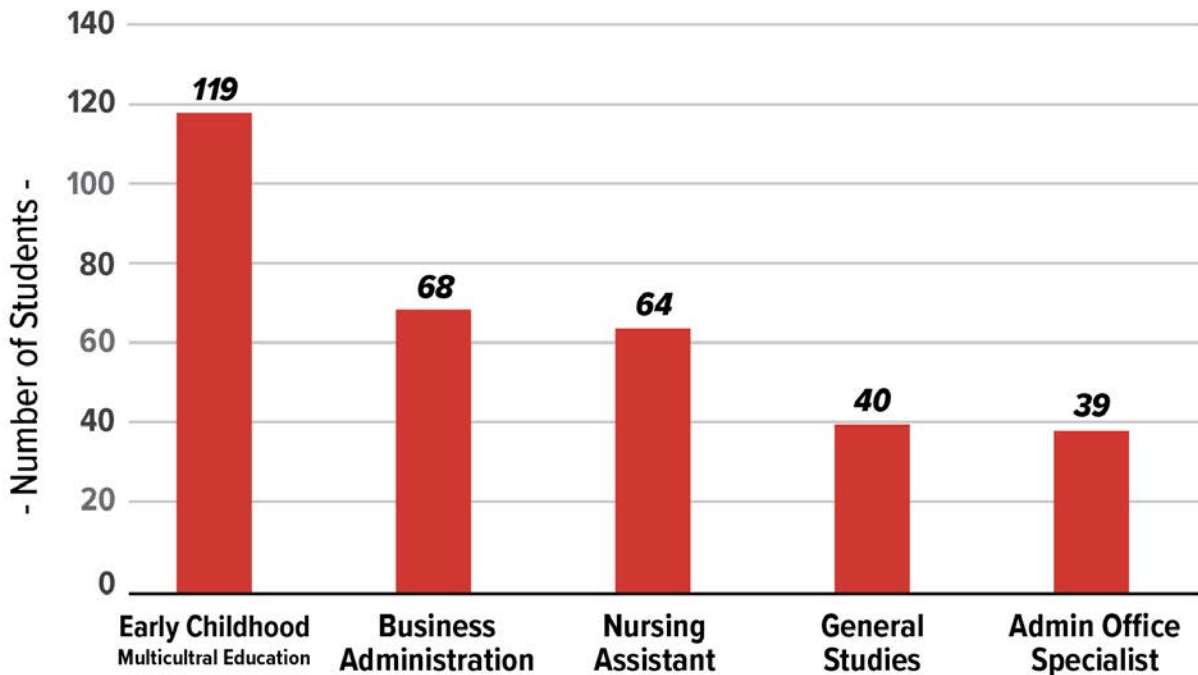
FALL 2022

Top 5 Degree Programs selected by Male Students



FALL 2022

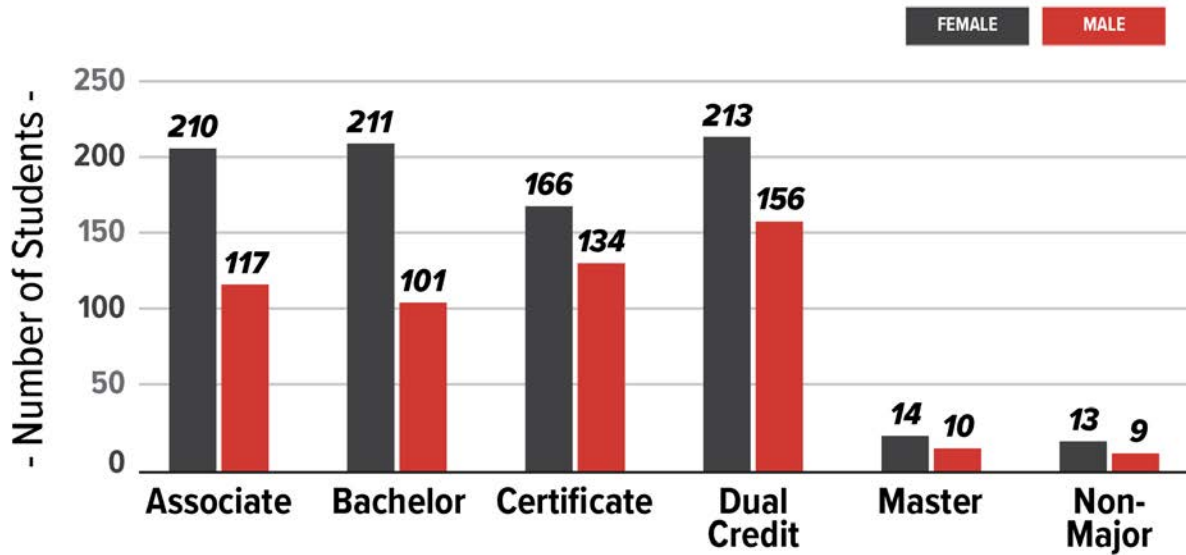
Top 5 Degree Programs selected by Female Students



The only degree program favored by female students that is not a steppingstone program is Administrative Office Specialist. Early Childhood Multicultural Education and Business Administration are baccalaureate degree programs. Students in the Nursing Assistant Certificate can choose to go on to the Registered Nursing program. General Studies students can choose several directions to go after graduation.

FALL 2022

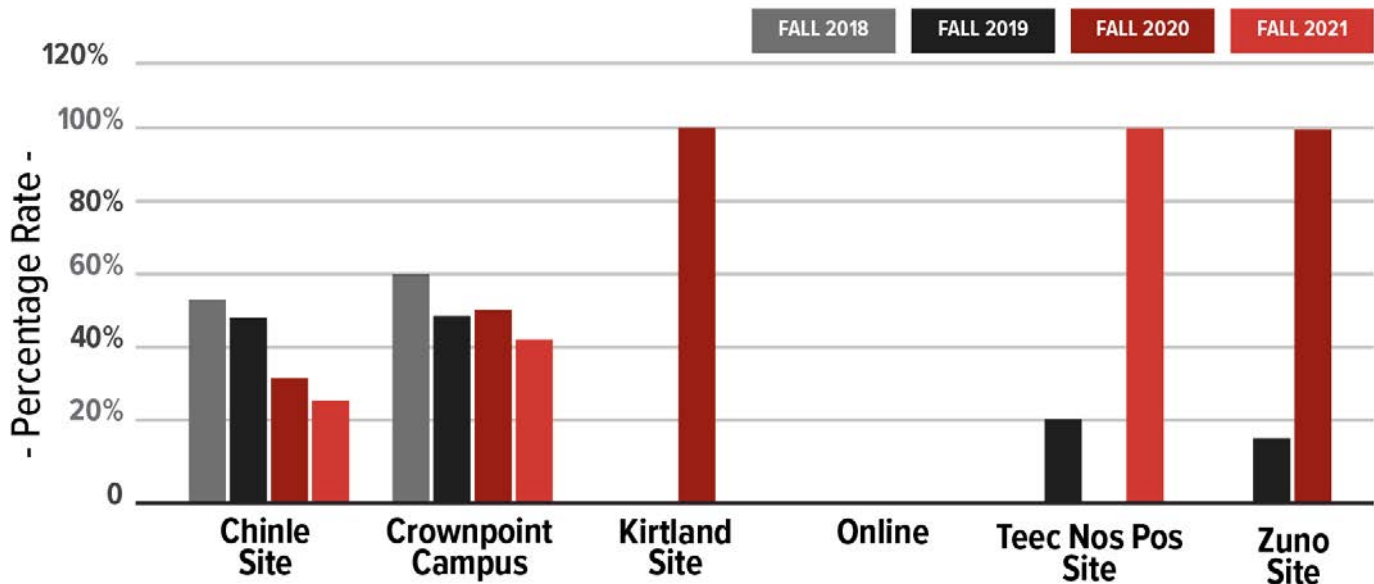
Degree Level by Gender



The most important note to be made about the degree level by gender chart is that males seem to prefer to at least start out in certificate programs while females often enroll in associate or baccalaureate degree programs in greater numbers.

NAVAJO TECHNICAL UNIVERSITY

First Time, Full Time, Degree Seeking Students Retention Rate



Retention rates at NTU compare favorably to those at other tribal colleges and universities, although the numbers in Kirtland, Teec Nos Pos, and Zuni are too low to be statistically significant. However, they continue to lag those at other colleges and universities nationally, which generally are at or above 50%. The retention rates for American Indian populations at other colleges/universities nationally compare favorably to those at NTU.

New Programs of NTU

NTU Wellness Center
Crownpoint, NM



One of the most important tasks at NTU since it became a university has been to continue to expand its undergraduate degree offerings into an increasingly broader range of academic disciplines. The effort to accredit these programs often takes more than a year and involves several committees and community groups. Often these efforts are undertaken to support a strategic priority by the Navajo or Zuni nations. Sometimes private sector businesses or corporations approach NTU and ask if one or another degree might be developed that they believe will support their employee needs for the future, thus increasing career prospect for NTU students.

The degrees that have achieved accreditation this year and are now part of the catalog include:

1. An Associate of Applied Science degree in Nursing
2. An Associate of Arts degree in Criminal Justice
3. An Associate of Applied Science degree in Cybersecurity
4. An Associate of Applied Science degree in Geology
5. A Bachelor of Science degree in Computer Science
6. A Bachelor of Science degree in Chemistry
7. A Bachelor of Arts degree in Law Advocacy

Construction Technology - SKYHAWK HIGHLIGHT



Construction Tech students demonstrate their masonry skills at the outdoor learning classrooms outside of the NTU Hooghan.



NTU Wellness Center
Crownpoint, NM

CONGRATULATIONS SKYHAWKS!

NTU, to begin 2023, offers 24 certificate programs, 17 Associate of Applied Science degrees, 4 Associate of Arts degrees, 3 Associate of Science degrees, 4 Bachelor of Applied Science degrees, 2 Bachelor of Science degrees, 1 Bachelor of Fine Arts degree, 10 Bachelor of Science degrees, 1 Master of Arts degree, and 1 Master of Science degree.

Partnership Example illustrating Some of What Goes into the Development of New Degrees

An example of how some of the new degrees come about can be seen through some of the partnerships built between the university and the private sector. In the case of the Applied Science degree in Cybersecurity, a Memorandum of Understanding was developed between NTU and Siemens Energy for pre-apprenticeship programs in industrial cybersecurity and advanced manufacturing. NTU then collaborated with Siemens on a Department of Labor proposal to develop an Associate degree in Cybersecurity. As this was happening, an MOU was developed and signed between NTU and the Department of Homeland Security (DHS) to collaborate in the areas of cybersecurity, climate changes, and research and internship opportunities. The eventual curriculum developed took Sieman's and DHS's push to develop a degree in cybersecurity into account as well as some of the ideas from discussions the Advanced Manufacturing Lab was having with the Department of Defense.

SKYHAWK HIGHLIGHT

Electrical Trades Program

The electrical trades classes meet each day in indoor or outdoor labs specifically designed for practical work experience within the trade. Safety rules, basic electricity, low voltage systems, ground fault circuit interceptors, correct and safe use of tools and equipment, design and installation of various circuits, use of the National Electrical Codes, and the study and practice of safe, efficient, and well-designed electrical systems for residential, commercial, and industrial facilities are the general topics covered in the program.



Funding for the Navajo Center of the Environment and Its Laboratories

One of the most important accomplishments during the year occurred when Arizona's legislature and Governor granted NTU four million dollars to build a Navajo Environmental Center in Chinle, AZ. The Navajo Nation committed another \$500,000 to that effort, and the project broke ground the new center on October 19. A USDA grant will be providing \$362,000 to the center for instrumentation. The laboratory, developed with the leadership of the Environmental and Natural Resources faculty, will be the only Environmental Protection Agency certified laboratory on the Navajo Nation. It has been designed for several purposes, including the ability to study heavy metal contamination, develop testing and other products that can be marketed to governmental agencies as part of an effort to sustain the laboratory in the future and to provide the Navajo Nation with the ability to mentor the Abandoned Uranium Mine (AUM) effort that is being undertaken to clean up contaminants that have caused disastrous health problems through the Nation since the 1950s. The lab will also be instrumental in continuing several important environmental initiatives taken by NTU concerning contamination of wells used for agriculture, finding solutions to environmental problems affecting the high desert environment, the protection of water and air essential to Navajo life, and others. Students on the Chinle campus will also be trained on how to do testing and using the laboratory for the benefit of the Navajo people.

Information Technology Department



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The IT department oversees the installation and maintenance of computer network systems within the university. The IT Department ensures that every resource and access is available for students, Staff, and faculty

The information technology office has worked to implement three student-directed network resources needed to decrease homework gap barriers. When finished, the student family housing facilities will be connected to the new NTU network over fiber optics through a service-oriented GPON network solution. The plan is for each room in student efficiency apartment buildings will get a residential network wired and a wireless access point for full-service access over a 40 Gbps backbone. The third initiative is in the last stage of development and is designed to deploy the Internet to the Hogan community wireless connection. The wireless project aims to provide students and families with connectivity options in communities with few options.

The information technology office is growing its authentication and user management system. User integration with our enterprise resources management service, campus resource access, and research infrastructure access through EduRoam are seamless, intuitive, and secure.

Plans have also been completed to begin implementing a wider-reaching ScienceDMZ project for several Tribal colleges in the southwest region. NTU IT will deploy hardware and software to Dinè College, the Zuni instructional site, Tohono O’dham Community College, and Southwest Indian Polytechnical Institute. SIPI is several steps behind, so its implementation plan is set for later this summer.



SKYHAWK HIGHLIGHT

Automotive Technology

Hands-on training from our experienced Technical Instructors of Automotive Technology, Steven J. Kollas, and Shanidiin Piechowski-Begay.



Construction

There were several construction projects undertaken during 2022. These included improvement to the landscaping, including a retaining wall and privacy fencing around faculty housing in Crownpoint, improved ADA accessibility compliance with sidewalks, doors, and elevators at all instructional sites, improved LED lighting, added new gazebos for outdoor learning, and updated the Crownpoint campus facility master plan.



In addition, a Request for Proposals (RFP) was issued for the design of faculty housing in Crownpoint, laundry appliances were replaced, and new cameras for safety purposes were installed.

Progress was also made regarding constructing the academic building in Crownpoint.

The following was accomplished during the year:

- Acquired Funding: State of NM GF / GOB
- Architectural Design and Engineering completed
- Held a groundbreaking ceremony for the 27,489 square feet academic building in Crownpoint that will house 13 classrooms, two large vocational classrooms, and 14 faculty offices
- Completed Construction Contract between NTU and Contractor
- Utility construction: natural gas, electricity, and sewer/water to Academic Building
- Demolition of existing concrete pad and mobilization completed
- Light poles have been received and will be up in the next 30 days
- Trenching for the retaining wall will begin in January 2022

Significant work was also completed in the long-term effort to build new student housing in both Crownpoint and Chinle.

SKYHAWK HIGHLIGHT

NTU IT Department and the National Science Foundation

On Dec. 3rd NTU IT Dept. improves Science DMZ Collaboration with the Front Range GigaPoP (Denver). This computer subnetwork is structured to be secure but would otherwise result from passing data through a stateful firewall without the performance limits. In 2018, NTU received a National Science Foundation (NSF) award to improve science on campus and to build new technology collaborations in the Navajo Nation and Arizona with the Front Range GigaPop (Denver, CO).



FY 2022 Financial Highlights

Net operating results decreased by 6 % from 2021 to 2022 due to increase of expenditures in Instructional, Student Services, Public Services, and Auxiliary Services. Operating revenue increased year over year due to a increase of enrollment, which affects tuition, federal student aid, and auxiliary enterprises. The non-operating activities revenue decreased by 30 percent due to an decrease in government appropriations and private grants which resulted in a change in net assets overall of a positive \$4.0 million for 2022.

	AUDITED - 05/31	UNAUDITED - 05/31
REVENUES	2021	2022
Tuition and Fees, Net	526,133	1,827,771
Auxiliary Enterprises	345,472	1,307,306
Other Revenue	40,569	318,197
Total Revenue	912,174	3,453,274
EXPENSES		
Instructional	7,743,957	9,335,970
Student Services	1,588,021	3,313,539
Academic Support	1,342,930	1,480,361
Public Services	361,029	519,014
Student Assistance	4,460,877	4,451,017
Institutional	12,370,265	8,961,083
Auxiliary Services	2,301,238	2,633,137
Depreciation	3,573,574	3,645,045
Total Expenses	33,741,891	34,339,165
Net Operating Results	(32,829,717)	(30,885,891)
NON-OPERATING ACTIVITIES REVENUE		
Federal Grants and Contracts	27,062,313	28,046,527
Government Appropriations	4,120,924	3,949,220
State and Tribal Grants and Contracts	780,457	1,204,826
Private Grants and Contracts	13,412,293	1,167,847
Other Revenue	1,650	2,296
Interest Income	21,805	606,088
Total Non-Operating Activities	45,399,442	34,976,803
CHANGE IN NET ASSETS	12,569,725	4,090,912

Project Funding

One of the benefits of achieving the level of publication students and faculty are now achieving at NTU is that it builds the reputation of the university for excellence with federal, state, and tribal agencies and helps increase funding through competitive grant competitions. This increased funding fuels increasing levels of research, but it also benefits students in numerous ways. Some funding allows the university to hire students or provide students with the opportunity to benefit Navajo or Zuni communities with projects. Others provide scholarships or internships. Most of the funding also provides experiential opportunities where students learn about the subject matter in their courses or about the research process itself.

New projects funded this year include the following:

1. Department of Energy (DOE)

Dec 13, 2022, NTU was awarded \$2.25 Million by the Department of Energy Basic Energy Sciences (BES) to study the effect of reactive gasses (oxygen, nitrogen, and carbon dioxide) on the formation of rapidly cooled metals as they occur in additively manufactured materials.

- *Principal Investigator (PI): Dr. Ramoni Monsuru, Industrial Engineering, NTU*

- *Co-Principal Investigator (Co-PI): Dr. Johnson Olanrewaju, Environmental Engineering Program, NTU*

- *Co-PI: Dr. Shanmugam Ragavanantham, Advanced Manufacturing Engineering Technology Program, NTU*

- *Co-PI: Dr. Frakron Osama, Engineering Technology Program, NTU*

The objective is to understand and control the effects these gas species, intentionally introduced into the cover gas in 3D printing, have on phase and microstructure formation near internal and external surfaces and subsequent mechanical and oxidation properties. This project involves using DED AM capabilities at NTU to print metal alloy parts that will be characterized by synchrotron x-ray computed tomography and x-ray diffraction and scattering at the Lawrence Berkeley National Laboratory in Berkeley (LBNL) Advanced Light Source facility (ALS) to reveal microstructure. Moreover, thermodynamics and kinetics modeling will help predict how processing parameters influence microstructure.

2. DOE: “ A People-Centered Decision Support Tool for Enhancing Power Grid Resilience for the Navajo Nation “ and the DOE Award Amount is \$900,000 with a cost share of \$230,000.

- *PI: Mohamed Illafe*

- *Co-PI: Dr. Abdulmtalb Hussen*

This project is developing a comprehensive energy decision support tool for the Navajo Nation using a people-centered approach where the value of energy is quantified from the perspective of its impact on the tribal community. Power system resilience for existing customers in Navajo Nation is challenged by a myriad of factors such as high wind, drought, and flooding, creating a complex multi-hazard risk environment. This project will bring together an inclusive team of experts in social science and multiple engineering fields, community partners, local government, and utilities to increase energy resilience for those both near and far from high-population centers on the reservation.

3. Los Alamos National Lab (LANL) MSI Workforce Program Funding: Management of Collaborations for Regional Minority Serving Institutions (MSI) Workforce Programs for Pit Manufacturing

- PI: Dr. Abraham Meles

- Co-PI: Dr. Abhishek RoyChowdhury, Steven Chischilly

Amount \$100,000. Received May 2022.

The project's main objective is to enhance the NTU's Science and Engineering curriculum to better address the Navajo Nation's community challenges and local job market needs by introducing course contents that infuse nuclear radiation technology into students' science and engineering skills.

4. LANL: Integrating Radiation Physics in Science and Engineering curriculum at Navajo Technical University-Phase II.

- PI: Dr. Abraham Meles

- Co-PI's: Dr. Abhishek RoyChowdhury, Steven Chischilly

Funding Agency: Los Alamos National Laboratory

Project Total: \$249,965

The Los Alamos National Laboratory (LANL) Plutonium Workforce Development Initiative (PWDI) seeks well-rounded applicants who demonstrate mastery of fundamental skills in specific disciplines related to radiation technology. NTU has Science, Engineering, and Technology program, which coincides with the LANL's most urgent skills needs. This proposal will bring a noble idea of supporting both the LANL and NTU missions by fine-tuning and enhancing NTU's curriculum by infusing radiation technology courses and training. This will improve NTU students' Science, Engineering, and radiation technology skills, making them well-rounded and fitting to the LANL's needs. In building the pathway to a career at the LANL, for the next two years, this project will target and support: Electrical Engineering, Chemical Engineering, Mechanical Engineering, Industrial Engineering, Advanced Manufacturing Engineering Technology, Information Technology, Automotive Technology, Computer Science, Environmental Science and Natural Resources, Engineering Technician program, Environmental Engineering, Business Administration, Accounting, and Nursing programs at NTU.

5. LANL: Project Title: Integrating Radiation Physics in Science and Engineering curriculum at Navajo Technical University.

- PI: Dr. Abraham Meles

- Co-PI's: Dr. Abhishek RoyChowdhury, Steven Chischilly

Funding Agency: Los Alamos National Laboratory

Project Total: \$100,000

The project's main objective is to enhance the NTU's Science and Engineering curriculum to better address the Navajo Nation's community challenges and local job market needs by introducing courses that infuse nuclear radiation technology into students' science and engineering skills. As a result, this would make students more knowledgeable in both engineering and nuclear radiation technology, widen their career options, and make them well-rounded, more responsive to their community challenges, and competitive in the job market.

6. LANL: New Mexico Consortium Funding: Strategy to support the Plutonium Workforce Development Initiative (PWDI) at Los Alamos National Laboratory

- PI: *Dr. Abraham Meles*

- Co-PI's: *Dr. Abhishek RoyChowdhury, Steven Chischilly*

Project Total: \$250,000. Received: November 2022

The project aims to enhance the development of a next-generation pit manufacturing technical workforce for LANL through active-learning-based education and state-of-the-art collaborative research in nuclear science and technology that supports pit manufacturing missions and that engages and broadens the participation of underrepresented minority men and women at Navajo Technical University.

7. NASA JPL HBCU/MSI Funding: MacGyvering Field Robotics with the Navajo Nation

- PI: *Abraham Meles (NTU)*

- Co-PI's: *Abhishek RoyChowdhury (NTU), Jim Bell (ASU – unfunded collaborator).*

Amount: \$50,000. Received March 2022.

The project aims at training students and professors in cross-disciplinary science and engineering skills and directly embedding promising students within JPL's hands-on field programs complementary to their education. In Sep 2022, Navajo Technical University hosted the first edition of the MacGyver Engineering Training provided by Dr. Andrew Klesh (NASA JPL). NTU students attended a four-day weekend training and completed the training by executing a weather balloon launching project led by students.

8. NASA: Project "Scheme for Promoting Indigenous Culture and Ethics among STEM Students (SPICES)" 08/01/2022 – 07/31/2024.

- PI: *Dr. Shanmugam Ragavanantham, Advanced Manufacturing Engineering Technology Program*

- Co-PI's: *Dr. Arockiasamy Madasamy, Sudhagar Nagarajan, Environmental & Civil Engineering Program, Florida Atlantic University, Florida*

- Senior Personnel: *Scott Halliday, Dr. Gholam Ehteshami, Dr. Casmir I. Agbaraji, Dr. Colleen W. Bowman*

August 10, 2022, NTU was awarded \$500,00.00 by the NASA MAIANSE CONNECT to promote and preserve the indigenous culture and ethics by fusing them into STEM education via NASA's unique assets.

This "NASA MAIANSE CONNECTing Scheme for Promoting Indigenous Culture and Ethics among Students (SPICES) with STEM" is led by Navajo Technical University (NTU) to (i) Increase Indigenous students' interest and involvement in STEM fields, (ii) Broaden participation of Indigenous communities in STEM fields, (iii) Co-create curricula and research projects in place-based STEM activities that braid NASA unique content with Indigenous culture, and (iv) Strengthen the capacity of NTU to graduate students. NTU will collaborate with the following alliance partners: i) Florida Atlantic University (FAU), ii) Kennedy Space Center (KSC), iii) Ames Research Center (AMC) and Armstrong Flight Research Center (AFRC), iv) Council for Diversity, Equity, Inclusion and Accessibility (DEIA), v) Raman Engineering LLC, vi) Ganado School District, vii) Navajo Preparatory School, viii) Community Youth Agency (Crownpoint) and ix) Octavia Fellin Public Library (OFPL).

(Continued next page)

NTU will focus on this project on the following subject areas: a) Earth Sciences/Geology, b) Climate Science/Change-Geospatial tools and knowledge) Agriculture/Plant Science/Botany/Biology, and d) Additive Manufacturing. NTU will create more baccalaureate and graduate degree programs, which will be beneficial and are in high demand areas. The strength and academic excellence at NTU because of the execution of this proposed project will be used as a leverage to attract more future funding.

9. NASA and the Navajo Nation: Weaving Western STEM and Navajo Traditional Knowledge into an Educational Ecosystem

- PI: Dr. Abhishek RoyChowdhury

- Co-PI: Steven Chischilly

Funding Agency: National Aeronautics and Space Administration

Project Total: \$494,189

This project aims to conduct research and develop a new K-12 curriculum and corresponding workshops and camps on the theme of the 'Origins of Life,' incorporating cutting edge NASA astrobiology science and Navajo Traditional Knowledge (TK). Our efforts will result in two main and related deliverables: 1) the K-12 curriculum, and 2) corresponding educator workshops and summer camps for middle/high school Navajo youth. These deliverables are enabled and energized in a community-based educational ecosystem made up of many organizations, individuals, resources, expertise, and facilities, tribal government departments, tribal and public K-12 schools, tribal colleges, museums and cultural centers, non-profits, universities, and other grassroots organizations and will bring Elders, community members, educators, professors, leaders, parents, government personnel, artists, cultural knowledge experts, and language specialists into the effort. This project will advance discovery and understanding in methodologies to increase NA/Al STEM representation by placing an indigenous faculty style STEM teaching, training, learning, and research model on equal footing with mainstream STEM training and research pursuits.

10. NASA: MacGyvering Field Robotics with the Navajo Nation

- PI: Dr. Abraham Meles

- Co-PI: Dr. Abhishek RoyChowdhury

Funding Agency: NASA Jet Propulsion Laboratory (JPL)

Project Total: \$50,000

This project aims to a) train students and professors in cross-disciplinary science and engineering skills and b) directly embed promising students within JPL hands-on field programs complementary to their education. At NTU, up to 10 select science & engineering students will be sponsored by this grant to participate in the NTU course, culminating in a high-altitude balloon flight of their embedded payloads. Part of the course focuses on what students can teach each other, and previous editions have included a student-run session on working with local cultures during field campaigns. The project team will work with local medicine-men to provide a Diné perspective on astronomy during the first weekend, while using ASU-donated telescopes to observe the skies. The course will culminate in a high-altitude balloon flight to characterize the atmosphere and take photos of the curvature of the Earth, reaching altitudes of up to 100,000 ft. Additionally, early in the summer, several students, selected by NTU, will bring their embedded systems knowledge to JPL, participating as JPL interns within Ocean Worlds lab. These students will

(Continued next page)

return to NTU (with a 1-week break in their internship) to participate in and mentor their fellow students through the MacGyver course. They will also assist NTU faculty in recommending a second cadre of students, chosen from the course participants, to participate as JPL interns during the fall. Students will pursue small, embedded projects, using components familiar to them from the MacGyver course, to enhance several submersible vehicles, including the JPL-funded Mini-Sub, BRUIE, and MiniIGT expected to have field deployments in 2022 and 2023.

11. Funding Agency: National Science Foundation (NSF) - Collaborative Research: RAPID: Opportunity to acquire continuous, high-resolution geochemical proxies for paleoclimate, paleoenvironment, and modern hydrogeology from CPCP cores

- PI: Dr. Abhishek RoyChowdhury, NTU

- Co-PI: Dr. Sean Kinney, Columbia University

Project Total: \$34,869

The first part of the Colorado Plateau Coring Project (CPCP-1) cored the entire Triassic record preserved at Petrified Forest National Park in three cores. Coring demonstrated that this rich record of biota and climate is archived in strata with many U-Pb datable levels and a recoverable paleomagnetic polarity stratigraphy. The dates and polarity sequence proved consistent with the eastern North American, astronomically calibrated, Late Triassic, Newark-Hartford section, and global Early and Middle Triassic records. Hence, coring allowed placement of these remarkable records into a high-resolution time framework with an order of magnitude less uncertainty than based on outcrops alone. Although the fundamental physical, geochronological, and paleomagnetic stratigraphy of the CPCP-1 cores have been published, providing a solid basis for further work, the chemical stratigraphy has lagged. The primary objective of this RAPID proposal is to fill this gap in fundamental characterization by taking advantage of a limited opportunity to use the Mianalyzer CS presently on lease at the repository of the CPCP-1 cores. This robotic XRF system can efficiently, and at low cost, generate continuous geochemical datasets from the CPCP-1 cores for paleoenvironmental analysis, exploration of the astronomical pacing of climate and depositional systems, and the development of a predictive framework for understanding the distribution of geogenic groundwater contaminants in Colorado Plateau bedrock aquifers.

12. NSF: Advancing Indigenous perspectives to address climate vulnerability in the Southwest: research training for and by diverse communities

- PI: Dr. Amy Whipple, NAU

- Co-PI: Steven Chischilly, NTU

Funding Agency: National Science Foundation

The amount subcontracted to NTU is \$84,000

NAU Flagstaff is the lead organization with NTU subcontractor

This program will train recent indigenous STEM graduates in conducting research on Climate Change in their home communities on their homelands to prepare them for graduate school. This program will be based in NAU Flagstaff and all participants in this program will need to relocate to Flagstaff for one year while they are in this program. This program pays a fellowship, and each participant is paired with a mentor at NAU.

13. American Association of Geographers

- PI: Dr. Nsalambi Nkongolo

Funding Agency: American Association of Geographers

2022-2023: AAG Bridging the Digital Divide. \$15,000.00 to improve the GIS program.

14. Funding Agency: United States Department of Agriculture, Rural Development (USDA) Project Title: Navajo Environmental Center

- PI: Dr. Abhishek RoyChowdhury

Project Total: \$362,140

The State of Arizona has recently awarded four million dollars to NTU to establish a Navajo Environmental Center at Chinle, AZ campus. The Navajo Nation has pledged another one million dollars for the project. As directed by The State of Arizona this Center needs to be completed within one year and NTU has already signed a contract with a design-build architect. The Environmental Center will work to create a healthy and sustainable natural environment and thriving Navajo economy. This Center will have a US Environmental Protection Agency (USEPA) certified laboratory with the capability of providing quality control for the Navajo Nation with the abandoned uranium mine cleanup currently underway through Superfund funding and will provide services to other communities and tribal groups facing environmental cleanup challenges. This USDA Rural Development funding will be used to buy the laboratory infrastructure, equipment, and accessories including certified fume hoods, chemical and acid resistant bench-spaces, shelves, tables to place the analytical equipment, and secure safety cabinets in compliance with USEPA regulations.

15. USDA: TCU Internship Program from USDA APHIS

- PI: Dr. Germaine Daye, NTU

Funding Agency: USDA APHIS

Project Total: \$44,340.00

This project aims to fully fund 5 summer internships (salary, lodging, travel, etc.) for NTU, SIPI, FDLTC, and NHSC tribal students. Students completed 8-week internships with Wildlife Service, Vet Service, Animal Care, and Plant Protection Quarantine.

16. USDA: Vet Tech Internship Program from USDA APHIS

- PI: Dr. Germaine Daye, NTU

Funding Agency: USDA APHIS

Project Total: \$27,000

This project aims to fully fund 2 summer internships (salary, lodging, travel, etc.) for NTU tribal students. Students completed 8-week internships with Wildlife Service, Vet Service, Animal Care, and Plant Protection Quarantine.

17. USDA: Safeguarding Natural Heritage Youth Program from USDA APHIS

- PI: Dr. Germaine Daye, NTU

Funding Agency: USDA APHIS

Project Total: \$50,000

This project aims to fully fund a two-week youth ag camp for jr high and high school students at the NTU campus. Group visited zoos, bird rehabilitation, native American beef, and Labatt foods in surrounding areas. The group also performed small ruminant herd health work in the local area. Students learned about vet medicine, animal science, environmental science, natural resources, biology, etc. and were encouraged to finish high school then attend college.

18. USDA: EXCITE Design Phase Vaccination mini grant from EXTENSION FOUNDATION

- PI: Dr. Germaine Daye, NTU

Funding Agency: EXTENSION FOUNDATION

Project Total: \$10,000

This project for \$10,000 to fund COVID-19 vaccination awareness and preparation in community outreach.

19. USDA: NTU Equity from USDA NIFA

- PI: Dr. Germaine Daye, NTU

Funding Agency: USDA NIFA

Project Total: \$157,142

This project aims to help fund the Animal Science program salaries and fringe benefits.

20. USDA: NTU Extension from USDA NIFA

- PI: Dr. Germaine Daye, NTU

Funding Agency: USDA NIFA

Project Total: \$246,000

This project aims to help fund community service/outreach/education activities/events and Land Grant program staff salaries and fringe benefits.

21. USDA: Climate change impacts on pinyon cone crops and pinyon jays on the Navajo Nation

- PI: Steve Chischilly, NTU

Funding Agency: USDA NIFA

Grant Amount: \$500K over three years with NAU Flagstaff as subcontractor

With the decrease of pinyon jays by approximately 80% throughout their range in the last 20 years, this grant is funded to determine why this decrease in their population is occurring. Pinyon jays are a key component in aiding pinyon pine seed dispersal. With the demise of the pinyon jay, we may see the dramatic decline of other species that rely on this species in this ecosystem.

22. USDA: Climate change and fuel wood harvesting impact on pinyon and juniper, Patterns of change and methods for re-establishment

- PI: Steve Chischilly, NTU

Funding Agency: USDA NIFA

Grant Amount: \$500K over three years with NAU Flagstaff as subcontractor

This grant is funded to analyze possible reasons for a great deal of mortality of Pinyon Pine (*Pinus edulis*) over the past few years on the Colorado Plateau. Various methodologies will be used to help ascertain reasons for this decline.

23. Department of Defense (DoD)

- PI: Scott Halliday

- Co-PI: Dr. Monsuru Ramoni

Funding Agency: Department of Defense (DoD)

Awarded: \$597,973

NTU was awarded a department of defense equipment grant to purchase a Zeiss Gemini scanning electron microscope (SEM) and a Zeiss smart zoom 3D microscope to help with metal additive manufacturing microscopy analysis. This will also provide opportunities for other departments to conduct high quality analysis such as battery storage research and environmental engineering research.

24. NM State food Insecurity Grant

- PI: Jerlynn Henry, NTU

Funding Agency: NM State Food Insecurity Grant

Project Total: \$138,000. *Received October 2022*

This Project will be used for student food insecurity. Food boxes will be issued to students that are in need and perform healthy food demonstrations.

25. Achieving the Dream (ATD)

- PI: Jerlynn Henry, NTU

Funding Agency: Achieving the Dream (ATD)

Project Total: \$51,000

The ATD grant is to assist students with emergency aid and paid internships.

26. Marathon Petroleum Corporation

- PI: Dr. Casmirl. Agbaraji, NTU

Funding Agency: Marathon Petroleum Corporation

Project Total: \$100,000

The grant will provide hands-on learning experience for NTU trades' students, i.e., Automotive Technology, Construction Technology, Electrical Trades, Heavy Equipment Operator, and Welding Technology programs.

26. Navajo Transitional Energy (NTEC)

- PI: Dr. Casmirl. Agbaraji, NTU

Funding Agency: NTEC

Project Total: \$20,000

The grant will provide hands-on learning experience for NTU students in the Energy Systems and Culinary Arts programs. Sensitive testing equipment and specialized tools will also be needed to keep in alignment with today's industry standards. The grant will also help meet students' needs and comply with the American Culinary Federation (ACF) accreditation requirements. Students will obtain training in professional cooking and baking, so they will understand the demands of product delivery.

SKYHAWK HIGHLIGHT

Culinary and Baking Programs

Cooking for NTU STEM Educators and Counselors Retreat Event. The ACF is a self-review process for improving the academic quality of culinary arts/baking and pastry programs. The NTU Culinary and Baking Programs are ACF-accredited (American Culinary Federation). Our goal and passion are to get our students industry ready, showing them the fundamentals needed to enter the industry.



Student Life & Activities

The Student Life & Activities office is based on activities that happen on and off campus. Student activities office arranges all student trips for the Fall, Spring and Summer semesters. We value the student's opinions and suggestions on what trips to take during the semester.

The activities office is also responsible for the NTU Student Senate and Miss NTU.



Students and Faculty Publications

One of the best indications that NTU is making progress toward becoming a significant research university is the number of publications achieved by students and faculty during the year. At one point, the list for any given year might include one or two publications. During the last couple of years the list has been exploding, the number of publications increasing every year. Students and faculty publications in 2022 are listed below.

- Acharya, U.A., A. Adare, A. Meles, C. Aidala, et al. (2022).** PHENIX Collaboration. Study of phi-meson production in p+Al, p+Au, d+Au, and 3He+Au collisions at $\sqrt{s_{NN}}=200$ GeV. *Phys.Rev.C* 106 (2022) 1, 014908, DOI: <https://doi.org/10.1103/PhysRevC.106.014908>.
- Acharya, U.A., A. Adare, A. Meles, C. Aidala, et al. (2022).** Measurement of Direct-Photon Cross Section and Double-Helicity Asymmetry at $\sqrt{s}=510$ GeV in PP Collisions. HEP-EX 2202.08158, DOI: <https://doi.org/10.48550/arXiv.2202.08158>.
- Asha LN., Dey A, Yodo N., Aragon LG.** Optimization Approaches for Multiple Conflicting Objectives in Sustainable Green Supply Chain Management. *Sustainability*. 2022; 14(19):12790. <https://doi.org/10.3390/su141912790>.
- Dekelaita-Mullet, D. (2022)** published chapters in two books that were released this year: *Introduction to Gifted Education* (2nd Ed.; Routledge) and *Making Literature Reviews Work: A Multi-Disciplinary Guide to Systematic Approaches* (Springer).
- Gajakosh, A., Kumar, R.S., Mohanavel, V., Shanmugam, R. and Ramoni, M., (2022).** Application of Machine Learning Techniques in Additive Manufacturing: A Review. *Applications of Artificial Intelligence in Additive Manufacturing*, pp.1-24.
- Ganesan, S., Sadha Sivam, Mari Elanchezian, Sellappan Senthilkumar, Sankar Ganesh Ramakrishnan, Thiagarajan Soundappan, Vinoth Kumar Ponnusamy (2022)** Environmental Pollution, Novel delipidated chicken feather waste-derived carbon-based molybdenum oxide nanocomposite as efficient electrocatalyst for rapid detection of hydroquinone and catechol in environmental waters, Volume 293, 118556, ISSN 0269-7491, <https://doi.org/10.1016/j.envpol.2021.118556>.
- Hespeler, S., E. Dehghan-Niri, M. Juhasz, Kevin Luo, H. Halliday, "Deep Learning for In-Situ Layer Quality monitoring during Laser-Based Directed Energy Deposition (LB-DED) Additive Manufacturing Process",** *Applied Sciences*, Vol. 12, 188974.
- Hozien, W. (2022).** Leading Transformational Change: Case Studies to Show Effective Decision Making. *American Association of School Administrators*.
- Hozien, W. (2022).** Introduction: Endangered Languages in our Midst. *Foundation for Endangered Languages, Navajo Technical University and University of New Mexico Conference Book*. Crownpoint, New Mexico.
- Kar, S., Ghosh, I., Chowdhury, P., Ghosh, A., Aitch, P., Bhandari, G., RoyChowdhury, A. (2022).** A Model-based Prediction and Analysis of Seasonal and Tidal Influence on Pollutants Distribution from City Outfalls of River Ganges in West Bengal, India and its Mapping using GIS tool. *PLOS Water*. <https://doi.org/10.1371/journal.pwat.0000008>.
- Kumar, M.S., Javidrad, H.R., Shanmugam, R., Ramoni, M., Adediran, A.A. and Pruncu, C.I., (2022).** Impact of print orientation on morphological and mechanical properties of L-PBF based AlSi7Mg parts for aerospace applications. *Silicon*, 14(12), pp.7083-7097.
- Lilian A. Juma, Nsalambi V. Nkongolo, James M. Raude, Caroline Kiai. (2022).** Assessment of hydrological balance in Lower Nzoia Sub-catchment using SWAT-model: towards improved water governance in Kenya. *Heliyon journal*. <https://doi.org/10.1016/j.heliyon.2022.e09799>
- Liu, S., Geethapriyan, T., Muthuramalingam, T., Shanmugam, R. and Ramoni, M., (2022).** Influence of heat-treated Cu-Be electrode on machining accuracy in ECMM with Monel 400 alloy. *Archives of Civil and Mechanical Engineering*, 22(4), pp.1-15.
- Mai, A., Terracciano, A., Abraham, J., RoyChowdhury A., Koutsospyros, A., Su, T.-L., Braidia, W., Christodoulatos, C., Smolinski, B. (2022).** Generation of biofuel from anaerobic digestion of *Scenedesmus obliquus* grown in energetic-laden industrial wastewater: Understanding microalgae strains, co-digestants, and digestate toxicity. *Environmental Progress and Sustainable Energy*. 2022; 41(2): e13801 <https://doi.org/10.1002/ep.13801>.
- Mhatre, A., Bethany Kalscheur, Haley Mckeown, Karan Bhakta, Aditya P. Sarnaik, Andrew Flores, David R. Nielsen, Xuan Wang, Thiagarajan Soundappan, Arul M. Varman, (2022).** Consolidated bioprocessing of hemicellulose to fuels and chemicals through an engineered *Bacillus subtilis*-*Escherichia coli* consortium. *Renewable Energy*, Volume 193, Pages 288-298, ISSN 0960-1481, <https://doi.org/10.1016/j.renene.2022.04.124>.
- Mokea, D.A. and NV. Nkongolo (2022).** Soil properties, CO2 emissions and tree biomass in mono-dominant and mixed-forest species of Yangambi Biosphere Reserve, Yangambi, Democratic Republic of Congo. *Society of the American Foresters Convention*, Sept 21, Baltimore, MD (Poster). <https://dx.doi.org/10.13140/RG.2.2.12298.95686>.
- Mokea, D.A. and NV. Nkongolo (2022).** Comparison of geostatistical models for predicting the spatial distribution of tree species in Yangambi Biosphere Reserve, Democratic Republic of Congo. *Society of the American Foresters Convention*, Sept 21, Baltimore, MD (Poster). <https://dx.doi.org/10.13140/RG.2.2.34109.33760>.
- Niri, Ehsan Dehghan, Co-Authors: Austin Rowan; Filmon Ghebreyesus; Sina Zamen; Lisa Willis; Harold Halliday "X-Ray Computed Tomography Analysis of Magnetically Oriented Short Steel Fibers and their Effect on Uniaxial Tensile Strength" (2022),** *Journal of Materials in Civil Engineering/ Volume 34 Issue 2*.
- Ostler, N., Hozien, W. Krauwer, S., Mezhoud, S., Moseley, C., Derhemi, E. & Elnazarov, H. (2022).** Compiled by Tuttle, S. *Foundation for Endangered Languages FEL XXVI Conference Book*. Crownpoint, New Mexico
- Paladugu, S.R.M., Sreekanth, P.R., Sahu, S.K., Naresh, K., Karthick, S.A., Venkateshwaran, N., Ramoni, M., Mensah, R.A., Das, O. and Shanmugam, R., (2022).** A Comprehensive Review of Self-Healing Polymer, Metal, and Ceramic Matrix Composites and Their Modeling Aspects for Aerospace Applications. *Materials*, 15(23), p.8521.

Ramoni, M., Shanmugam, R., Thangapandian, N. and Vishnuvarthanan, M., (2022). Challenges in Additive Manufacturing for Metals and Alloys. In Innovations in Additive Manufacturing (pp. 57-72). Springer, Cham.

Tuttle, Siri G and Håkan Lundström (2022). "Athabascan Vocal Genres in Interior Alaska" in Lundstrom, Håkan and Jan-Olof Svantesson, Eds., In the Borderland Between Song and Speech. Lund: Lund University Press. Pp 123-187.

Vandever, M., Halliday, S. (2022). Native Science Report: The Comparison of Microstructure and Mechanical Behavior of Stainless Steel 316L Using Near Net Shaped and Fully Embedded Methodologies Using DED Metal Advanced Manufacturing. <https://nativesciencereport.org/2022/01/the-comparison-of-microstructure-and-mechanical-behavior-of-stainless-steel-316l-using-near-net-shaped-and-fully-embedded-methodologies-using-DED-metal-advanced-manufacturing/#more-6424>

Conference Proceedings

The conference proceedings participated by NTU students and faculty are presented below.

Bebo, C., Tibbits, D., Kinney, S., Slibeck, B., Chang, C., RoyChowdhury, A., Olsen, P. How Are Geogenic Contaminants Affecting Ground Water on The Colorado Plateau? Geological Society of America Abstracts with Programs, Volume. 54, No. 5. <https://doi.org/10.1130/abs/2022AM-381854> (Denver, CO, October 9-12, 2022)

Benjamin D. Bevans, Chris Barrett, Tom Spears, Aniruddha Gaikwad, Alex Riensche, Ziyad Smoqi, Scott Halliday, Prahalada Rao. "Multi-scale Shape Agnostic Flaw Detection and Monitoring in Laser Powder Bed Fusion using Heterogeneous In-process Sensor Data"; Solid Freeform Fabrication Symposium: An Additive Manufacturing Conference, 2022.

Chischilly, S., Roy Chowdhury A. Sustainable Water Resources: Complex Challenges, Integrated Solutions Water Institute 2022 Symposium, University of Florida, Gainesville, FL, February 22-25.

Chischilly, S., Impacts of Climate Change on the Navajo Nation, Alaskan Indigenous Climate Change Camp, Seward Alaska, May 8-14, 2022.

Chischilly, S., Place-based research and co-creating science to engage Navajo students 16th Biennial Conference of Science and Management for the Colorado Plateau and Southwest Region, High Country Conference Center, Northern Arizona University, Flagstaff, Arizona, September 12–15, 2022.

Chukovenkova, M., Andrei Zagrai, H. Scott Halliday, Joshua Toddy, Nylana Murphy. "Ultrasonic testing of metallic alloy specimens with application to additive manufacturing"; ASME International Mechanical Engineering Congress and Exposition, IMECE 2022.

Hozien, Wafa; Nelson, Sharon; Sage, Franklin and Siri Tuttle: Language Programs at Navajo Technical University. First Annual TCU Native Languages Summit. Virtual, March 25, 2022.

Kinney, S., Chang, C., Tibbits, D., Bebo, C., Cannato, J., Danyi, C., Galletta, A., Lee, B., McCracken, R., Pinnella, M., Slibeck, B., Prabhakar, L., Stempkovski, I., Witkowski, R., Browning, J., Miller, K., RoyChowdhury, A., Olsen, P. Development of High-resolution Paleoclimate Dataset from Whole Rock Geochemistry of Two Continuously Cored Mesozoic Continental Sequences. American Geophysical Union Fall Meeting. Chicago, IL, December 12-16, 2022.

Morris, K., RoyChowdhury, A., Wilson, D., Tome, M., Frey, B., Yu, J. Advanced Membrane Desalination Technology for Navajo Nation Groundwater Remediation. Geological Society of America Abstracts with Programs, Volume. 54, No. 5. <https://doi.org/10.1130/abs/2022AM-380933>, Denver, CO, October 9-12, 2022.

Riensche, A., Reza Yavari, Emine Tekerek, Lars Jacquemetton, Harold (Scott) Halliday, Ziyad Smoqi, Vignesh Perumal, Antonios Kontsos, Kevin Cole, Prahalad K. Rao (2022). Digitally Twinned Additive Manufacturing: Real-time Detection of Flaws in Laser Powder Bed Fusion by Combining Thermal Simulations with In-Situ Meltpool Sensor Data." Solid Freeform Fabrication Symposium: An Additive Manufacturing Conference., 2022.

RoyChowdhury, A. Connection Between Decades Long Water Issues and Spread of A Pandemic: A Navajo Nation Case Study. Geological Society of America Abstracts with Programs, Volume. 54, No. 5. <https://doi.org/10.1130/abs/2022AM-379670>, Denver, CO, October 9-12, 2022.

Thomas, Wesley. Presentation of "Global Indigenous Identifications & Identities: Diné/Navajo, An Example," Keynote Address at Global Indigenous Workshops at Indiana University, Bloomington, IN. November 05, 2022.

Wilson D., RoyChowdhury, A. Assessment of San Juan River Health After Gold King Mine Spill. Geological Society of America Abstracts with Programs, Volume. 54, No. 5. <https://doi.org/10.1130/abs/2022AM-381845>, Denver, CO, October 9-12, 2022.

Zhang, Z., Morris, K., RoyChowdhury, A., Datta, R., Sarkar, D. Organic Amendment Effects on Soil Quality in Coal Gob Spoils in Navajo Nation: Incubation Study. ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD, November 6-9, 2022. <https://scisoc.confex.com/scisoc/2022am/meetingapp.cgi/Paper/142915>.

SKYHAWK HIGHLIGHT

NTU Welding Program - School Front Entrance

Designing the rug took two weeks by Verna Sue Casamero and her interns, three days to put it together, and another four days to put it into the ground. The interns have also assisted with the summer programs by helping fellow students and helping with the outdoor learning centers in Chinle and Teec Nos Pos.



STRATEGIC PLAN

NAVAJO TECHNICAL UNIVERSITY: 2020 - 2025



The Board of Regents approved a new strategic plan that will be implemented at all NTU locations for the next five years. The plan's priorities were established based on information collected from were established from information collected at listening sessions held by the Committee on Institutional Effectiveness (CIE) over two years at each of NTU's five locations. The plan is aimed at strengthening the culture and integrity of NTU; increasing the diversity of Navajo communities; and improving the university with a variety of innovative programs.



THE STRATEGIC PLAN INCLUDES SIX PRIORITIES:

- Academic Excellence
- Financial Services
- Communication and Institutional Research
- Infrastructure
- Development of Instructional Sites
- Sustainability



**NTU IS ACCREDITED WITH THE
HIGHER LEARNING COMMISSION**

- 10 Year Approval 2018 -

SPECIAL PROGRAM ACCREDITATIONS WITH:



Veterinary Technology



American Culinary Federation
The Standard of Excellence for Chefs

Commerical Baking, Culinary Arts

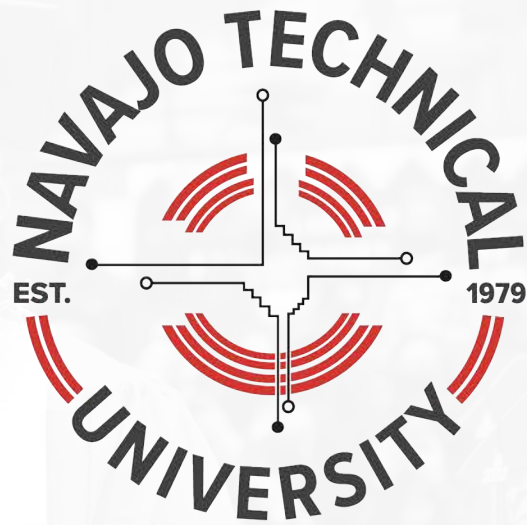


Engineering
Accreditation
Commission

Electrical Engineering, Industrial Engineering



Carpentry, Construction Technology,
Electrical Trades, and Welding



*“Navajo Technical University honors
Diné Culture and Language, while
educating for the future.”*

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