

Connie Nelson

**Elementary Education,
Mayville State University**

"Working as a STEM Ambassador helped me gain confidence in my abilities to teach STEM concepts to elementary students. I love working with younger students and watching them collaborate to solve problems. There is nothing more rewarding than seeing 23 1st-4th graders build their own bristle bots!"

While completing her degree, Connie also holds a position at Mt. Pleasant School in Rolla, ND as a Special Education Paraeducator.



Emma Twedt

**Biological Sciences Education,
North Dakota State University**

"Being a STEM Ambassador has challenged me to look for creative ways to teach science concepts, and has given me so much hands-on experience teaching STEM. I've loved the opportunity to see the range of STEM experiences available to people in North Dakota!"

In the spring of 2019, Emma will be student teaching at Park Christian School in 8th grade Earth Science, 9th grade Physical Science, 11th grade Chemistry, and 12th grade Physics classes.



Levi Lemer

**History, Science, and Composite in
Chemistry Education, Minor in Coaching,
Mayville State University**



NDSGC Activities with NDVS School for the Blind

Throughout 2018, the NDSGC team visited the North Dakota Vision Services/School for the Blind (NDVS/SB), which is located in Grand Forks, ND. They conducted multiple hands-on STEM activities with students who are visually impaired or blind. The NDSGC team continues to strengthen their collaborative relationship with this school, bringing STEM to students of all ages.



Houston School for the Blind Space Camp

In August, the Deputy Director, Coordinator, and Emily Stenberg, an educator from Grand Forks' North Dakota Vision Services/School for the Blind (NDVS/SB), traveled to Houston, TX where they assisted in the first annual Space Camp for students with vision impairments. Collaborating with South Carolina Space Grant Consortium's Director, Dr. Cass Runyon, and staff from the Space Center, they led a three-day camp. Students worked with tactile space resources and hands-on activities, toured the space center, visited the Saturn V rocket, and networked with other students with vision impairments. This memorable experience will benefit future local workshops between the NDSGC and students from the NDVS/SB.

A special thank you goes to Stephanie McMahon, Accessibility and Inclusion Specialist at Space Center Houston, for establishing the camp and including us in the inaugural year of the program. The NDSGC team also learned from the invaluable experiences of Gail Henrich, Teacher for Students with Visual Impairments/Orientation & Mobility Specialist (TVI/O&M) for Norfolk Public Schools in Virginia. The Virginia Space Grant Consortium sponsored a student and chaperone from VA to attend the camp as well.



NASA Mathematician and Engineer, Bob Shelton, who is completely blind, shared his story and accessible mathematics software that he created with the campers.



Students calculate the apogee of rockets that they constructed.



Students had the opportunity to ask questions during a presentation by retired NASA astronaut, _____.



Undergraduate Student Instrument Project USIP

The NDSGC continued to work on their Undergraduate Student Instrument Project (USIP). USIP is a competitive project that promotes hands-on flight research for 47 higher education teams across the nation. In 2018, the NDSGC team launched a high altitude balloon with the goal of capturing a temperature profile of the atmosphere. UND Engineering students constructed the sensitive thermosonde to gather data for the UND atmospheric science team. Due to project requirements, the ballooning team conducted their first night launch on May 4th. The team recovered the payload one day later, near Maple Lake in Minnesota. Future steps include introducing a UND marketing student to the team, as well one more launch in 2019.



Inflatable Lunar/Martian Analog Habitat

The University of North Dakota (UND) conducted its fifth mission in the Inflatable Lunar/Martian Analog Habitat (ILMAH), in May 2018, housing three crewmembers for 14 days. UND is the only university in the United States to conduct this type of space exploration research, which helps prepare for long-duration Martian missions. The crewmembers live in this confined environment, studying psychological factors, biomedical research, and mission operations.

Crewmembers lived in three modules; the living quarters, a botany/greenhouse module, and an EVA module. Docked to the ILMAH via a tunnel is the Pressurized Electric Rover (PER), which students use to conduct Extravehicular Activities (EVAs), or spacewalks outside of the habitat. During the sixth EVA, these three crewmembers launched a high altitude balloon with the help of the Atmospheric and Educational Student Initiated Research (AESIR) Ballooning Team, led by NDSGC student, Denise Buckner. The ILMAH crewmembers tested flight systems, simulating a Martian launch. New ballooning equipment was designed, space suit flexibility was examined, and GPS systems were utilized. The mission was a success, and the crew members received great flight data.

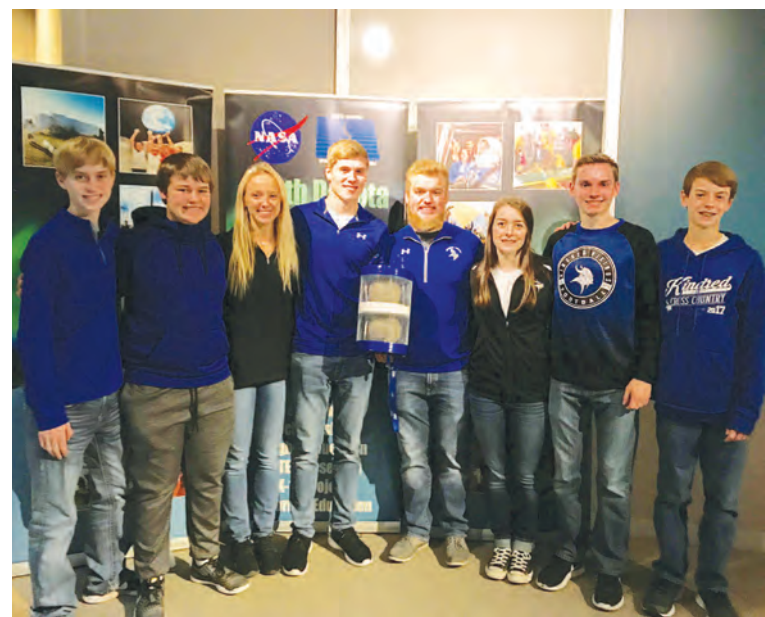
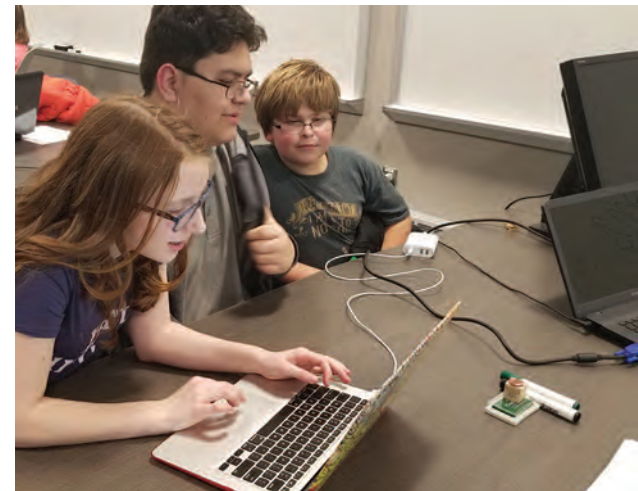
To learn more about the Human Space Flight Program at UND, visit: <https://goo.gl/9ZK9M3>

Near Space Balloon Competition

From October 2017 to January 2018, the NDSGC engaged six towns in a hands-on STEM project, called the Near-Space Balloon Competition (NSBC). All North Dakota students in grades 6 – 12 are eligible to form a team, propose an experiment, and become a NASA scientist! At the start of the school year, teams designed their experiments, visited UND to integrate the payloads together, and ventured to Northern Cass School in Hunter, ND to launch a giant helium-filled high altitude balloon. Students then boarded buses and tracked the balloon as it ascended 19 miles high into the atmosphere! Students quickly located the experiments in Tamarac National Wildlife Refuge in Minnesota.

In 2018, the teams analyzed their data and submitted final reports, presenting their findings and lessons learned. Congratulations to the Kindred high school seniors on their first place accomplishments. In addition, one of the Kindred students, Brianna Maddock, was named a 2018 US Presidential Scholar!

Many thanks to the North Dakota teachers who volunteered their time to engage their students with this STEM program!





Community Outreach Events



In the 2017-2018 academic year, the NDSGC team worked with K-12 students and their families at various outreach events across the state. With the help of the STEM Ambassador program, the NDSGC reached a total of more than 4,200 North Dakotans in informal education initiatives. Through K-12 specific programs, the NDSGC impacted nearly 2,100 K-12 students and more than 130 teachers. These events include Marketplace for Kids events, visits to public libraries, STEM Days, STEAM Days, and a STREAM Camp, public presentations, Super Science Day, the Water Festival, Science Olympiad, STEM Adventure Camp, STEMtastic, K-12 classroom visits, and Aerospace Community Day. These outreach events took place in Grand Forks, Fargo, Minot, Bottineau, Bismarck, Jamestown, Mandan, Rugby, Mayville, New Town.

These outreach events are a joint effort of all affiliate institutions. A special thank you is extended to the North Central Education Cooperative, Dakota College at Bottineau, Nueta Hidatsa Sahnish College, United Tribes Technical College, and the Gateway to Science Center for their coordination and participation in these initiatives in the past year.





The Human Spaceflight Laboratory (HSFL), housed within the Space Studies Department at the University of North Dakota, includes the space suit laboratory, spacecraft simulators, electric rover, and inflatable habitat. In-person and virtual tours of the Human Spaceflight Laboratory at UND included groups from Girl Scouts, Boy Scouts, preschool groups, K-12 field trips, the Nurturing American Tribal Undergraduate Research and Education (NATURE) program, the Research Experience for Undergraduates (REU) program, Aviation Camps, NASA personnel, ROTC cadets, and various summer camps.





Aerospace Community Day

On February 3, 2018, the John D. Odegard School of Aerospace Sciences at the University of North Dakota opened their doors to approximately 2,500 visitors in a celebration of their 50th anniversary. Guests of all ages – including families, UND students, staff, and faculty, and industry members – immersed themselves in aviation, space studies, atmospheric science, sustainability, and flight operation experiences. Guests stamped their “UND Aerospace Passports” at various stations throughout the day. They explored static displays of helicopters and airplanes, operated aircraft and spacecraft simulators, heard research talks from aerospace students and faculty, flew small UAS, toured the space suit laboratory, experienced virtual reality, controlled the 360° air traffic control tower simulator, and participated in many other aerospace demonstrations and activities.

The NDSGC served on the organizing committee for this event, and was actively engaged with other UND Aerospace faculty, staff, and students to inspire the next generation of explorers. Space Studies graduate students and STEM Ambassadors also assisted with the event, leading hands-on activities and tours of the human spaceflight laboratory. Families could hold real meteorites, test their communication skills in an Apollo 13-based simulation, and launch their own stomp rockets with the goal of landing on Mars.







Educator Professional Development

Pre-Service Teacher Workshops



The NDSGC conducted educator workshops for 151 in-service teachers in the past year. Participating affiliate institutions included Valley City State University, United Tribes Technical College (UTTC), and the University of North Dakota. Teachers got hands-on with NASA activities at workshops throughout the year, the largest event being the North Dakota STEAM Conference for Math and Science teachers. A special thank you goes to the North Central Education Cooperative (NCEC) for organizing professional development opportunities as well!



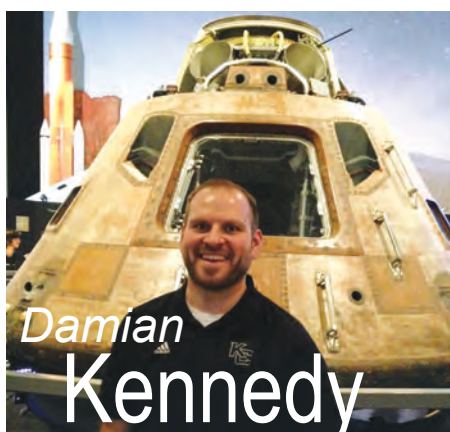
Space Exploration Educators Conference (SEEC)

The NDSGC supported three North Dakota teachers to attend the Space Exploration for Educators Conference, held at NASA's Johnson Space Center and Space Center Houston, in February 2018. We asked each of them to reflect on their experiences and offer advice to future ND educators.



Amanda Skinner
Williston High School
9-12 Robotics, Programming, Physics

"It's one thing to be aware of NASA's accomplishments through TV and the internet, but SEEC is a grand experience that makes NASA real to educators. The connections I met at SEEC presented an opportunity to send a student to intern at NASA last summer; I would recommend that ND teachers follow NASA on social media to become aware of these amazing opportunities."



Damian Kennedy
Steele Elementary – Kidder County
5th Grade, 6th Grade Science

"Through this awesome experience, I learned more about the history of the United States space program while also learning science concepts that have enhanced learning in my classroom. North Dakota educators should not miss this opportunity to network and collaborate with educators from all around the country and world!"



Kathleen Lentz
Washington School –
Valley City Public Schools 5th Grade

"After four exciting days, I came back to my classroom with renewed energy and enthusiasm for Space education and STEM activities. I now incorporate a STEM Minute into my daily routine. First thing every morning my students engage in a STEM challenge to get their brains focused and engaged. If you're looking for inspiration and tons of innovative ideas, attend SEEC!"



In-Service Educator Workshops

The NDSGC partners with a different affiliate college each year for an in-service summer training for North Dakota educators to earn professional development credit. In July 2018, the NDSGC worked with UTTC and 6 educators on a "Mission to Mars" themed workshop, where participants worked in teams to complete a crewed journey to Mars, while learning about NASA resources and integrating new teaching strategies into existing STEM lesson plans.





Team 877
Cando

Team 877 met throughout the fall and winter to work on driving skills, CAD activities, and programming. Their robotics team conducted a demonstration at a local nursing home and was featured at school pep rallies. They competed in a regional tournament in Grand Forks, North Dakota. Their robot passed inspection with no mechanical or electrical problems and was able to get onto the field for ALL practice and qualification rounds. This was the third year they coded in Java. There is a saying that a good team never loses, either they win or they learn.

This year, team 877 learned! They designed and built a very ambitious robot and created very complex autonomous code; code that didn't work as reliably at the event as it did in the shop. The team did an outstanding job troubleshooting and upgrading the robot during competition, and worked with field staff to isolate the programming bugs, but were unable to advance beyond the qualification matches this year. They received quite a lot of attention from the design judges! Their robot was the only one at the competition to utilize a vacuum-based pickup mechanism.

The 2018 season was a season of growth for The Herd. Their team expanded into two separate teams, one for West Fargo schools and one for Fargo schools. The two teams, along with the Moorhead team, worked alongside each other in the STEM Alliance Robotics Center of Fargo Moorhead that was donated by a local businessman and funded through a coalition of local and corporate businesses. At the Great Northern regional in Grand Forks, they won the Imagery Award and made it to quarter finals. They helped the Fargo team win the Rookie Inspiration Award, allowing them to compete in the world competition in Detroit! At the Iowa regional in Cedar Falls, their team became third alliance captains, made it to the semifinals, and won another Imagery Award.

During the preseason, students worked together to perfect their skills. Team members continued to volunteer at various events and assist more FIRST teams than in previous years. During the season, their team strived to push the boundaries of what can be done. They designed a robot that could compete in every aspect of the 2018 game. This proved to be a great challenge, but was very rewarding. They were recognized by their peers and competition judges for their work. Students grew their skills and went beyond every expectation that was placed on them. They are looking forward to future seasons!

FIRST Robotics

Thunder Robotics
Northwood-Hatton



Thunder Robotics built their robot "Ed" and competed in two regional tournaments. At Grand Forks, they won 9 straight matches, were the 4th seeded alliance and won the Spirit Award. At Duluth, they again were the 4th seeded alliance but lost in the semifinals. The team is active in their communities and helped to host a prime rib "Hoof and Wheels" supper, ran a summer golf tournament and competed in two fall competitions. At the Minnesota Robotics Invitational in Minneapolis, team 876 took 2nd place and at the NMRC tourney and in Bemidji, the team won the championship.



The NDSGC awards fellowships to ND faculty each summer to develop new courses or revise existing courses in STEM fields, of relevance to NASA. Faculty are encouraged to incorporate engaging educational techniques focused on improving student learning.

Summer Faculty Fellowships



Andre
DeLorme

Science | Valley City State University
BIOL 740: Limnology



David
DeMuth

Science | Valley City State University
Supernova Neutrino Masterclass



Michael
Dodge

Space Studies | University of North Dakota
**SpSt 575:
Remote Sensing Law & Policy**



Julie
Robinson

Teaching, Learning, and Professional Practices | University of North Dakota
TLPP 518: Science in the Elementary School



David
Wibe

Science and Education | Turtle Mountain Community College
ASTR 300: Astro-Imaging



Sherry
Fieber-Beye

Space Studies | University of North Dakota
**SpSt 570:
Scientific Writing: Proposals**



We Are #NASAiND

North Dakota students work hard, have fun, and love to share their passion! Take a look at their 2018.

nd_space_grant

We had a BLAST showing teachers some fun hands-on activities for their classrooms! They expertly designed tools for the Neutral Buoyancy Lab, saved Mark Watney on Mars, and landed their own rovers safely on the Martian surface.
#rugbynorthdakota
#professionaldevelopment

nd_space_grant

The Hatton/Northwood FIRST robotics team, #876, was amazing at regionals! They're true professionals and great team players!

nd_space_grant

Could you survive a trip to Mars? These @uofnorthdakota astronauts are performing a two-week study to simulate an analogue mission!
#undproud #myund





nd_space_grant

We're at the @uofnorthdakota career fair today! Stop by our booth at the wellness center to learn about #NASA internships and more #STEM opportunities. #UND Proud



nd_space_grant

His experience from the Shuttle, looking down on Earth? "Spaceship Earth has no borders. Madagascar was all deforested, the Aurora was breathtaking. #Undproud #NASAinND

nd_space_grant

The NDSGC assisted Associate Professor Angie Bartholomay, of @dakotacollege with her workshop at the #NDSTEAM Conference today! @vcsuvikings #Is-ThereWaterOnZork #Science #Zorkians





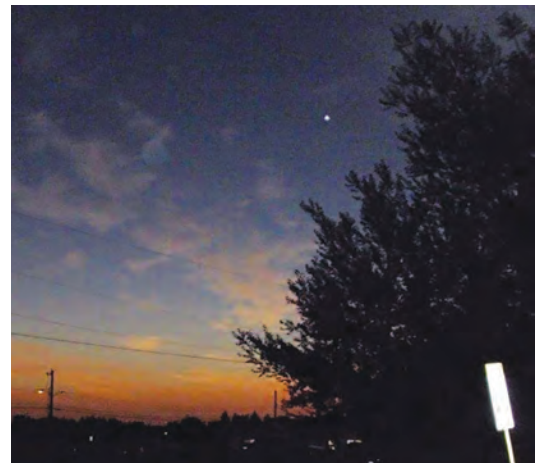
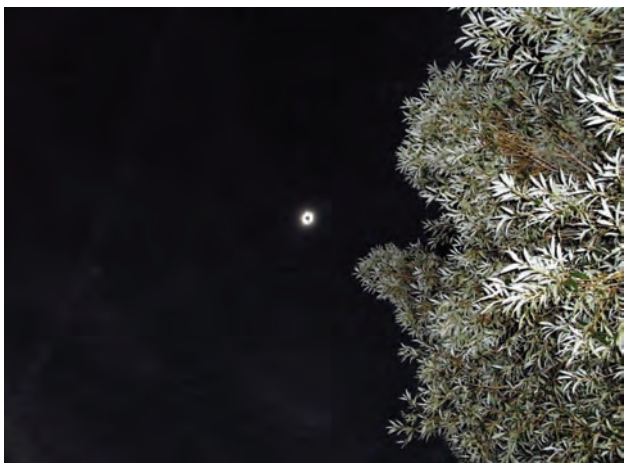
Dane
Schaffer

Minot State University

Meet an Affiliate

Dane Schaffer is an Assistant Professor of Science at Minot State University and became a Space Grant Affiliate in the spring of 2017. Dane grew up in Mt. Vernon, IN and attended Purdue University where she earned a BPE in Physical Education with a minor in General Science and endorsements in athletic training and coaching. However, Dane's true love was science, especially the Earth Sciences. After graduating from Purdue, she came back home to teach and coach. Soon after, Dane started her Masters in Secondary Education with an emphasis in Science Education at Indiana State University. While starting her Masters, Dane taught science for grades 5-8 as well as the seventh grade at a local parochial school in Evansville. After finishing her Masters at ISU, Dane left Indiana to teach as the Lead Teacher for Physical Science in Kansas City, MO. After five years, Dane went across the state to teach College Prep Earth Sciences in the Ferguson-Florissant School District in St. Louis County, MO. In all, Dane taught nearly 25 years before returning to the University of Missouri, Columbia, to complete her Ph.D. in Learning, Teaching, and Curriculum with an emphasis in Science Education.

As a four-year faculty member at Minot State, she is implementing more professional workshops for her practicum (Elementary and Secondary) students to attend as a way to get to know what is available to them as North Dakota classroom teachers as well as chances to present at state conferences. Dane's research on teachers' conceptual understanding of the water cycle and plate tectonics and the development of tiered assessments have been presented and published on the international level. In her spare time, Dane likes to sit with her telescope observing the skies and celestial events. See the pictures below.



We Want You!

The NDSGC is also looking to expand its reach in various programs with students and educators across North Dakota. If you are interested in any of the opportunities described in this newsletter, or if you would like to arrange a visit from the NDSGC at your institution (e.g. STEM Ambassador outreach events, teacher workshops, informational presentations, etc.) please reach out to any member of the NDSGC team. Contact information is listed on the inside of the front cover.

Social Media

Connect with the NDSGC via social media platforms. Tag us in your posts with #NASAinND. Follow us on the following platforms to stay up to date on events, funding opportunities, deadlines, exciting projects, and much more!



NorthDakotaSpaceGrant



@NDSGC



@ND_Space_Grant



North Dakota Space Grant



@ndspacegrant

ndspacegrant.und.edu



Thank You!

None of these events would be possible without the amazing work of representatives at the NDSGC affiliate institutions (listed on the back cover). Their efforts allow the NDSGC to expand its reach statewide and ensure that students across North Dakota are able to participate in a number of programs. The NDSGC would like to thank each of them for their dedication to NDSGC programming, promotion of opportunities, and continued involvement.

Thank you also to Kathy Borgen (Graphic Artist in the Department of Space Studies at the University of North Dakota) for designing the Aurora Newsletter each year. Her creativity allows the NDSGC to share successes of the past year and highlight opportunities for more North Dakotans to get involved in the future.



Bismarck
State College



Cankdeska Cikana
Community College



Dakota College
at Bottineau



Dickinson
State University



Gateway to
Science Center



Lake Region
State College



Mayville
State University



Minot
State University



North Dakota State
College of Science



North Dakota
State University



Nueta Hidatsa
Sahnish College



Sitting Bull
College



State Historical Society
of North Dakota



Turtle Mountain Commu-
nity College



United Tribes
Technical College



University of
North Dakota



Valley City
State University



Williston
State College