



PUSHING HER LIMITS

Undergraduate research has played a key role in the experience and success of University of Northern Iowa senior Nicole Bishop. For the past two years Nicole has worked with Dr. Joshua Sebree in the Chemistry and Biochemistry Department. Nicole enjoys planning and conducting the experiments. Their project seeks to replicate components of Titan's atmosphere. Titan is one of Saturn's moons.

Nicole is continuing her research this semester because of an Iowa Space Grant Consortium Research Fellowship award. Undergraduate research is an experience she is not sure she would have gotten elsewhere.

Nicole remembers spending much of her time with extra-curricular activities and working while attending high school in Elkhart, Iowa. At that time she had no interest in math or science. She shifted focus to being a *student first* when she stepped onto the UNI campus.

Nicole came to UNI undecided about what she wanted to study. She was curious and sought various opportunities on campus. She joined the Student Nature Society. One day she decided to attend a graduate lecture on bear research. This lecture helped her find her path.

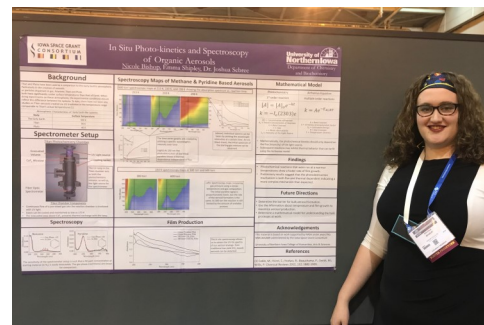
Nicole said, "The student spoke so passionately about the migration of bears and I stopped and thought, *I want that*. Not the whole bear thing, but I want that much excitement about something I know and want to tell others about it." After this experience, Nicole started to take more science classes.

Eventually she became a chemistry major. She went on to say that the experience of seeing the end result of a research project, made her want to put in the work to achieve a similar education. She took classes in subjects that she believed she had no interest in. She went outside her comfort zone and challenged her mind. By doing so, she has found more joy in her education and more feelings of accomplishment, because she has had to work hard. Success is more sweet when it is earned.

NASA's Cassini mission collected data about the chemical composition of Titan's atmosphere, which is primarily methane and nitrogen. Using Cassini data, Nicole and Dr. Sebree are able to create a similar atmosphere on a much smaller scale. In the laboratory, they have set up experiments utilizing high intensity light to study Titan's thick, hazy atmosphere. Running similar experiments and changing the temperature to be more representative of Titan's temperature, has led to further understanding of how the atmosphere acts and its properties. It is different than the Earth's and other moons and planets in our solar system,

but how? Nicole is fascinated learning about something beyond the Earth's atmosphere.

Nicole is part of a team researching Pluto's atmosphere as well as early Earth. The BETA Project is a three-year grant awarded by the Iowa Space Grant Consortium. Its purpose is to trace the biogeochemical evolution of the Earth's atmosphere. By studying other atmospheres, the researchers are better able to understand the Earth's and to see if life is possible on other moons and planets in our solar system.



Nicole Bishop presenting at the 2018 National American Chemical Society Conference.

"I want that... I want that much excitement about something I know and want to tell others about it."

-Nicole Bishop, Chemistry Major

This past summer Nicole, her research partner Jaspreet Kaur Rishi, and Dr. Sebree traveled to Goddard Space Flight Center. They spent ten days working on their research and meeting and learning from NASA scientists. They were able to run elemental analysis for the Titan atmosphere project on NASA's high-tech equipment.

"If you really want it, run at it with everything you have."

-Nicole Bishop, Chemistry Major

One of Nicole's favorite activities while at NASA were the *coffee-talks*. Scientists got together 2 mornings a week to talk about everything from life in general to research to grant proposals they are writing. She said it was amazing to see all of the collaboration occurring between the different sciences and be at a place where the main focus is furthering knowledge. Personally, for Nicole, it was an opportunity to go somewhere and be able to picture her *end goal*. She was able to solidify her goal of becoming a researcher. Nicole's dreams are manifesting into reality because of her excitement about science and her willingness to say yes to experiences like the NASA trip.

Nicole will be presenting her current research at the ACS Regional Conference in Ames in October. The University of Northern Iowa supports students like Nicole with opportunities to present at regional and national conferences.

Nicole is an inspiration to other students. She says, "At some point you have to bet on yourself. I came to UNI thinking that I could not do math and science, but found out it is what I wanted. I learned that if I wanted it bad enough, I would find a way to make it happen." This is exactly what she has done and is now taking an advanced math class, just for fun. "If you really want it, run at it with everything you have."



Nicole Bishop preparing elemental analysis samples at NASA's Goddard Space Flight Center (left). At UNI's RodCon, Nicole and the UNI Affiliates of the ACS tell jokes during one of the breaks (right).

For additional information for the BETA project see STEM story from March 2016 at <https://stemed.uni.edu/stem-beat?page=10>.



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