Issue 48, 2022-2023

The Math Log

Newsletter of the University of North Dakota
Mathematics Department

New Tenure-Track Faculty Member Joins Department

Dr. Bryce Christopherson joined the UND Mathematics Department as a tenure-track faculty member in the fall of 2022. Dr. Christopherson completed his Ph.D. degree in Mathematics at the University of Wyoming in 2019. Prior to his studies at the University of Wyoming, he earned a B.A. degree in Mathematics and Economics at Augustana University in Sioux Falls, South Dakota.

Before coming to UND, Dr. Christopherson worked as a data scientist, full stack developer,[1] and mathematician in the Intelligence Innovation department of the Strategic and Global Awareness Directorate of the Defense Systems Group at the Aerospace Corporation in El Segundo, California. Prior to his service at the Aerospace Corporation, he served as a lecturer and tutoring director in the Department of Mathematics and Statistics at the University of Wyoming.

Dr. Christopherson's position in the UND Mathematics Department is research-intensive. Most of his mathematical research is in the area of stability and stabilization in a very general sense. Dr. Christopherson notes that "broadly and informally, stability describes a phenomenon through which some collection of objects 'eventually become the same' in some way. More to the point, stability describes how parameterized families of objects eventually--as the parameter is varied--come to share a specified property and, relative to this chosen property, 'settle down' or stop fluctuating. Often, the existence of some form of stability allows one to derive useful facts and new objects through various limiting operations and may provide additional information that might not otherwise be readily accessible." Dr. Christopherson will be doing collaborative research with other UND faculty members, including faculty members outside the Mathematics Department. He says that he is particularly interested in working on research problems that have "defense applications" and problems that involve machine learning[2] or autonomous systems.[3]

Dr. Christopherson will also teach courses here in the Mathematic Department. He has wide teaching interests, but he is particularly excited about the possibility of teaching a graduate-level course in functional analysis.

Dr. Bryce Christopherson

Dr. Christopherson is originally from Brandon, South Dakota. He now lives in Grand Forks with is wife Anna and one-year-old son Ken. The Christophersons have a dog Asimov and a cat Juniper. When Dr. Christopherson is not working on mathematics or spending time with his family, he enjoys reading science fiction, running, weight lifting, painting, and spending time outdoors.

Department Hosts Annual Fall MAA Meeting

The annual fall meeting of the North Central Section of the Mathematical Association of America (MAA) took place in the newly rebuilt Memorial Union on the UND campus on October 14 and 15, 2022. Speakers from several different colleges and universities in the region gave mathematical talks. Among the many speakers were UND Mathematics Department faculty members **Jeremiah Bartz**, **Bryce Christopherson**, and **Joel Iiams**. UND graduate student **Jacob Denault** also gave a talk. Many people helped with the preparations for the meeting and

1. Data science is the science of analyzing data and making meaningful conclusions from the data. A stack developer is a person who develops and maintains computer application programs for use by individual end users.
2. Information on machine learning is available on the Web at en.wikipedia.org.
3. An autonomous system is a particular type of system of differential equations.

the meeting itself. Mathematics faculty members **Jeremiah Bartz**, **Timothy Prescott**, and **Ryan Zerr** were the main organizers of the Fall 2022 meeting. The North Central Section of the MAA serves Minnesota, North Dakota, portions of South Dakota, and the Canadian provinces of Manitoba and Saskatchewan. A different school hosts the fall MAA meeting each year. It may be several years before UND hosts this meeting again.

Visitor Presents Lecture

Dr. Torin Greenwood, of North Dakota State University, presented a talk entitled "Generating Functions and RNA" here at UND on Thursday, September 8, 2022. The talk was part of the Edward O. Nelson Memorial Lecture Series. This lecture series is named after **Dr. Edward O. Nelson**, who began service in the UND Mathematics Department in 1950. Dr. Nelson retired in 1993 and passed away in 2010.

Sympathies for the Family of Dr. Milton E. Winger

We extend our sympathies to the family of **Dr. Milton E. Winger**. Dr. Winger was a faculty member in the UND Mathematics Department for many years. He passed away in April of 2022 at the age of 90. Dr. Winger came to the department as a graduate student in the year 1955 and completed a master's degree here in 1956. He began a teaching job in the UND Mathematics department shortly after his graduation and continued teaching here for several years. In the late 1960s, he began work toward a Ph.D. in Statistics at Iowa State University. He received a leave of absence from UND to make his Ph.D. studies possible, but he also did some of the work toward his Ph.D. here in Grand Forks. Dr. Winger completed his Ph.D. in 1972 at the age of 40. He served as Chair of the UND Mathematics Department from 1984 to 1990 and retired from UND in 1992. He remained in contact with the Mathematics Department for several years following his retirement. He would often attend Mathematics Department picnics, and he sometimes visited us here in the Mathematics Department offices. We will miss Dr. Winger. To see a more detailed obituary for Dr. Winger, visit the Web site

www.amundsonfuneralhome.com

and search for "Winger." The Fall 2004 issue of the *Math Log* contains a short article describing an interview with Dr. Winger.

Sympathies to the Family of Mrs. Donna Boe

We also extend our sympathies to the family of **Donna Boe**, who passed away in May of 2022 at the age of 80. Mrs. Boe served as a clerk here in the Mathematics Department office from 1986 until her retirement in the spring of 2011. If you visited the Mathematics

Dr. Milton E. Winger

Department office during this period, you may have met Mrs. Boe. A very short article on Mrs. Boe appeared in the 2011-2012 issue of the *Math Log*. An obituary for her is available on the Web at

www.bakerfuneral.com/obituaries

Search for "Donna Boe." We will miss Donna.

Bartz Promoted

UND has promoted Mathematics Department faculty member **Dr. Jeremiah Bartz** to the rank of Associate Professor. The University has also granted tenure to Dr. Bartz.

Faculty Footnotes

Jeremiah Bartz, **Bruce Dearden**, and **Joel Iiams** have published the article "Jump sizes for polygonal balancing numbers" in the *Australasian Journal of Combinatorics*.

Jeremiah Bartz, **Bruce Dearden**, and **Joel Iiams** have also published the article "Polygonal balancing numbers I" in the journal *Integers*.

The article "On a property of 2-integrally closed domains," by **Anthony Bevelacqua**, has been published in the journal *Communications in Algebra*.

Bryce Christopherson, Boris Mordukhovich, and Farhad Jafari have published the article "Continuous feedback stabilization of nonlinear control systems by composition operators" in the journal *ESAIM. Control, Optimisation and Calculus of Variations*.

Krista Lynn Minnotte and **Michael Minnotte** have published the article "The Ideal Worker Norm and Workplace Social Support among U.S. Workers" in the journal *Sociological Focus.*

The *Mathematics Magazine* has published the article "Infinite series as sums of triangular areas," by **Hans Musgrave** and **Ryan Zerr**.

Jeremiah Bartz now serves as an editor of "Playground," a special problem column that appears in every issue of *Math Horizons*, a widely circulated popular journal published by the Mathematical Association of America (MAA).

Jeremiah Bartz gave the talk "Good Things Come in Threes" at the Texas Number Theory and Combinatorics Seminar, which was held at the University of Texas at Tyler in September of 2021.

Where They Are and What They Are Up To

Tiffany Findlay (B.S. 2019) completed a degree in law at UND's School of Law in 2022. She has since passed her bar exam and now works for a law firm in Hillsboro, North Dakota, a few miles from Grand Forks. The law firm also has offices in West Fargo, North Dakota, and as part of her legal work, Tiffany usually travels to the West Fargo office one or two times each week.

Scott T. Paulson (B.S. 2008) lives in Eagan, Minnesota, and now teaches mathematics at a middle school. Scott is married to Kelley Spoden Paulson. You can reach Scott by e-mail at scottpaulson26@hotmail.com or by paper mail at 3888 Westbury Lane, Eagan, MN 55123.

Charles Sarabun (M.S. 1972) is now retired, after having served at the Johns Hopkins University Applied Physics Laboratory. You can reach Charles by e-mail at csarabun@hotmail.com or by paper mail at 4785 Arlington Drive, Sykesville, MD 21784.

Laurence Thomas Ramsey (B.S. 1970) is now retired. His spouse is David Zen Liang. You can reach Laurence by e-mail at tomramsey98@gmail.com.

Howard A. Larson (M.S. 1962) lives in Idaho Falls, Idaho, and is now 91 years old. He was a full-time student here at UND from 1958 to 1962. During this period, he also had a nighttime job: he worked full-time for the Great Northern Railroad,[4] serving as a telegrapher in the railroad's telegraph office at the Great Northern depot in downtown Grand Forks. Howard also got married while he was still a student here at UND. After graduation in 1962, he worked at the National Reactor Testing Station for Phillips Petroleum Nuclear. A few years later, Howard completed a Ph.D. at the University of Washington Engineering School in Seattle, Washington. After completing his Ph.D., he went to work at the Experimental Breeder Reactor II, near Idaho Falls. He also began part-time teaching at Idaho State University. Fifteen years later, he accepted a position of Associate Professor in the engineering school at Idaho State.

Howard and his wife have now been married for more than 64 years. In the years since his retirement, Howard and his wife have had time to travel through parts of Montana, North Dakota, Washington, and Oregon. They have also traveled to visit their children. Howard has a message for students. He says, "I hope you have as satisfying life as my wife and I had. I might add that one of the things I learned during my years was to exercise patience." He says that many people will not be as fortunate as he has been, but we should all appreciate and enjoy what we have received.

New Teaching Professors Join Department

Aloysia Larson joined the Mathematics Department in the fall of 2022 and currently serves at the rank of Teaching Assistant Professor. Mrs. Larson is originally from Fargo, North Dakota, but now lives in Moorhead, Minnesota. She has an M.S. degree in Curriculum and Instruction with an Emphasis in Mathematics from Minnesota State University Moorhead (MSUM).[5] She will be teaching online courses only. When she is not working on mathematics, she enjoys working on crafts and growing plants. Mrs. Larson and her husband also enjoy spending time outdoors with their two dogs.

Dr. Reem Albashaireh also joined the UND Mathematics Department in the fall of 2022. She currently serves as a Teaching Assistant Professor. Dr. Albashaireh lives in Oxford, Mississippi, and teaches online courses only. She completed her Ph.D. degree in Mathematical Sciences from the University of Alabama in Huntsville (UAH) in December 2014. Her research interests include differential equations and dynamical systems with applications to biology and physics. She is interested in studying the existence and stability of solutions to nonlinear partial and ordinary differential equations that model systems such as reaction-diffusion and chemotaxis[6] phenomena.

In her spare time, Dr. Albashaireh enjoys the Wordle game. She enjoys cooking for her family and friends and listening to National Public Radio (NPR). She also enjoys country music. Dr. Albashaireh is originally from Jordan (in the Middle East). She says, "But I lived in Huntsville Alabama for fourteen years, so I consider Alabama my home. Sweet Home Alabama!"[7]

Department Hosts Math Track Meet

The Mathematics Department hosted the annual Mathematics Track Meet event on February 21, 2022. The Math Track Meet is a competitive event for selected students in grades 7 through 12 from the Grand Forks area. The 2022 Track Meet had the usual in-person format (as opposed to an online format). Registration records indicate that 108 students participated. Isaac Hong and Eli Zerr were among the students who received special awards. Isaac is the son of Mathematics

4. After a sequence of several mergers, the Great Northern Railroad is now part of the BNSF Railway.
5. MSUM was formerly known as Moorhead State University.
6. According to the tenth edition of *Merriam Webster's Collegiate Dictionary*, chemotaxis is the "orientation or movement of an organism or cell in relation to chemical agents."
7. According to the online encyclopedia Wikipedia, "Sweet Home Alabama" is a song by the rock band Lynyrd Skynyrd.

Department faculty members **Doojin Hong** and **Eun-Jung (E-J) Youn**. Eli is the son of Math faculty member **Ryan Zerr**. Many people helped with the preparations for the Math Track Meet and the actual event itself. Faculty members **Timothy Prescott**, **Radha Panini**, and **Ryan Zerr** served as general coordinators for the 2022 Math Track Meet. We thank the coordinators, the people who helped, and the participants themselves!

Scholarships

The Mathematics Department has offered scholarships to several students for the 2022-2023 academic year. The students were as follows:

Sydney Menne and **Brandon Schulte** (Ronald C. and Ann C. Bzoch Memorial Scholarship)

Audrey Rubish (Deann & Lee Christianson Scholarship)

Sierra Walker (David Uherka Mathematics Scholarship)

Jacob Denault (Paige Plagge Memorial Mathematics Scholarship)

Nolan Larson (Joseph A. Guzek Mathematics Scholarship)

Thomas Iken and **Madisen Ellingson-Stumphf** (Diana L. Wells Memorial Mathematics Scholarship)

Jacob Denault (Judy Ann Utton Memorial Scholarship)

Jennifer Parent (James Rue Mathematics Scholarship)

Sydney Menne, **Isaac Balmer**, **Jennifer Parent**, **Thomas Iken**, **Madisen Ellingson-Stumphf,** and **Nolan Larson** (Jay O. & Marie Bjerkaas Mathematics Scholarship)

UND's College of Arts and Sciences has selected **Jacob Denault** to receive the John & Lyle Buchwitz Scholarship.

GTAs Progress toward Graduation

Several Graduate Teaching Assistants (GTAs) in the Mathematics Department are nearing the completion of their master's degrees. We hope to have further information on these students in the next issue of the *Math Log*. We also hope to report on new GTAs in the department.

Math Log Editor Visits with Professor at Polytechnic School

Danica (Belanus) Allard currently serves as an Associate Professor in the Mathematics Department at Bismarck State College in Bismarck, North Dakota. Danica received her B.S. and M.S. degrees in Mathematics here at UND in 2010 and 2012, respectively. Bismarck State College (BSC) is a polytechnic school which emphasizes training for professional careers. Most students at BSC earn two-year degrees, but the college also offers four-year degrees in a few specific professional areas. Many students complete two-year degrees at Bismarck State and go on to complete four-year degrees at other schools.

Danica Allard

The *Math Log* editor spoke with Danica last summer. We discussed her background, her experiences here at UND, and some of the challenges she faces as a mathematics teacher. We discussed "video assignments" and some of the other specific teaching techniques she uses. Danica also shared some more general thoughts about teaching, along with a few additional words of wisdom.

Danica is originally from Devils Lake, North Dakota, not far from Grand Forks. Her father served as the director of the Job Service North Dakota employment office in Devils Lake, and her mother was a physical therapist. Danica completed an Associate in Science (A.S.) degree from Lake Region State College in Devils Lake in 2008. In the fall of that year, she enrolled as an undergraduate student here at UND. She took courses from UND Mathematics Department faculty members Drs. **Gerri Dunnigan**, **Thomas Gilsdorf**, **Doojin Hong**, **Joel Iiams**, **Richard Millspaugh**, **Michael Minnotte**, and **Lawrence Peterson**. She served as a tutor in the Mathematics Learning Center here at UND and as a paper grader for Mathematics faculty member **Mr. Stuart Farm**. Over the course of her college years, Danica also served as a bank teller and as a cleaner in an office building. On one occasion, she helped out with the Mathematics Track Meet, an event which the UND Mathematics Department holds each

year.[8] During her M.S. studies at UND, Danica served as a Graduate Teaching Assistant (GTA), teaching her own sections of Math 103 (College Algebra). **Dr Joel Iiams** was Danica's academic adviser for her M.S. independent study report.

Acts of Kindness

Danica recalled one small but memorable "act of kindness" that occurred at the time of her graduate studies here. One day, she walked into the Mathematics Department office and told our secretary at the time, **Mrs. Lona Spicer**, that her car had a flat tire. She asked Lona if she knew of a nearby service station that had an air pump. Mathematics faculty member **Dr. Richard Millspaugh** happened to overhear the conversation. Dr. Millspaugh was a member of a popular motor club, and he called the motor club's special "roadside assistance" number. Dr. Millspaugh was able to have someone come and fix the flat tire. This was very helpful, as Danica was short of funds at the time!

Danica also recalled how she used to work with her fellow GTAs. Most of the GTAs had small offices located in two adjacent rooms on the third floor of Witmer Hall, and they would frequently see each other in these offices. The GTAs were students themselves, of course, and at any given time, many of them were taking the same classes. Danica recalled how the GTAs would discuss their classes together. She said that the GTAs were a "happy family."

Danica completed her M.S. degree in Mathematics here in the spring of 2012. She says that she "loved it at UND." If the Mathematics Department had offered Ph.D. degrees, she would have applied for admission to the Ph.D. program here. The UND Mathematics Department did not (and does not) have a Ph.D. program, however, so in the fall of 2012, Danica took a job teaching mathematics at Northland Community and Technical College in East Grand Forks, Minnesota. She continued teaching at Northland until 2014. In August of 2014, she began service in the Mathematics Department at Bismarck State College.

Danica's teaching load at Bismarck State is very high. She always teaches at least 15 credit hours of courses each semester, and she sometimes teaches as many as 19 or even 20 hours per semester. An instructor with a 15-hour teaching assignment would normally be in class for 15 class sessions each week, with each class period lasting 50 minutes. A 15-hour teaching load is typical for mathematics teachers at two-year colleges, but it is higher than the teaching load for many teachers at 4-year colleges and universities such as UND.[9]

Cheating

During her service at Bismarck State, Danica has taught courses in elementary algebra, college algebra, and precalculus, as well as Calculus I and II. In recent years, Danica has taught both online and on-campus courses. As you may know, students in online courses need not come to the campus. Danica's online students watch recorded lectures that she has prepared for them. Danica uses various methods to assign and grade homework and to administer exams for her online students. One interesting tool she uses in online teaching is "video assignments." For a video assignment, she has each student write out a problem solution, scan it into a computer file, and explain the various steps of the solution orally. The student uses a laptop computer and appropriate recording software to record his or her explanation. When Danica grades each student's video assignment, she reads the student's written work and watches the student's video. She then provides written and spoken feedback to the student. She provides the spoken feedback by recording a short video of her own and making this video available to the student. When the student watches Danica's video, the student can see Danica as she speaks. She feels that her students appreciate "seeing and hearing the person behind the text."

Danica spends a significant amount of time grading the video assignments and providing feedback, but she says that these assignments provide her with a good way of knowing if her students really understand what they are doing. This is important. Some students occasionally cheat on homework assignments by using certain cell phone apps to obtain solutions to the assigned problems. The student may scan in the problem and supply it to the app. The app then supplies the answer together with the written work that one would do to obtain it. Danica's video assignments provide a good way for her to combat cheating of this type.

For her online courses, Danica usually uses online computerized homework systems in addition to the video assignments. For homework in her on-campus courses, however, Danica has her students do odd-numbered problems from the course textbook. The students write their solutions out on ordinary paper, and Danica collects the papers. She says that if she collects paper solutions in this way, her students will ask more questions in class. This is good, of course. Answers to odd-numbered problems usually appear in the back of the book, but Danica expects her students to show their work. Danica has many students, and she cannot scrutinize each student's work in detail. Nevertheless, she can get some sense of whether her students are actually doing the necessary work for each problem, and she assigns grades accordingly.

For her on-campus courses, Danica spends most class time answering questions and giving traditional classroom lectures, but she occasionally has her students participate in various mathematical activities during the regular class period. She usually has at least one classroom activity for each chapter of the course textbook. From time to time, she has each student write out a problem solution on the whiteboard.

8. More information on the Math Track Meet is available on page 3 of this issue of the *Math Log*.
9. Teachers at four-year colleges and universities often teach courses that are more advanced than the courses typically taught at two-year colleges. Teachers at four-year schools often engage in scholarly research and devote much of their time to various activities in areas other than direct classroom teaching. These considerations usually result in teaching loads of less than 15 credit hours per semester.

Math Anxiety

Many of Danica's students struggle with mathematics. To help them, she holds at least one "office hour" each day, but students also come to see her at other times during the day. The number of questions students ask varies from day to day. On some days, Danica is either in class or answering questions in her office for virtually the entire day. As a consequence, she must sometimes prepare for her classes at home, but not until after her children have gone to bed! Danica is very willing to answer her students' questions, of course, but she says that many students ask questions too hastily. She feels that occasional struggles should be a normal part of mathematical studies.

Danica spends a large amount of time teaching her students, but direct classroom and online instruction is not her only responsibility. Situations often arise in which she needs to perform tasks not directly related to her own teaching. Examples of this include the preparation of various reports for the College and participation in various "assessment" activities. Here the word "assessment" refers to special activities and procedures the College uses to determine whether most students are achieving certain specific learning goals. Some of Danica's non-teaching activities extend well beyond routine reporting and assessment. In a recent e-mail message, Danica indicates that she has recently become the Vice President of the Faculty Senate at Bismarck State!

Danica is clearly a very busy person, but she says that she enjoys her work. "If I didn't like it," she says, "I wouldn't do it." She enjoys watching students work hard and succeed. Some of her students experience "math anxiety." Such students have difficulty with mathematics, and some are simply afraid of it. But students with math anxiety sometimes begin to understand mathematics much better and eventually come to enjoy the subject. Observing such a change in a student is one of the more fulfilling parts of Danica's work.

I asked Danica what type of person would make a good mathematics teacher. She replied by saying that the teacher must bring knowledge down to the level of the students. Instead of using complicated mathematical jargon to explain mathematics, the teacher should begin by explaining the subject in more ordinary language. After the students begin to understand, the teacher can then introduce more formal and technical definitions and explanations. Danica compared her teaching to the work of a medical doctor. Medical doctors are familiar with all sorts of advanced technical terms which they could use to describe an illness or ailment, but a family physician needs to explain medical problems and their treatments to a patient in a language that the patient can understand.

Danica is married to Steven Allard. Steven received a bachelor's degree in Business Administration from UND in 2010 and currently serves as a loan officer at a bank in Bismarck. Danica and Steven were married in 2011 and have three children. Their oldest child is in kindergarten. In spite of her busy schedule, Danica has had time to take adult ballet lessons recently. She enjoys being outdoors. When she happens to be driving alone in her car, she enjoys listening to audio books.

I asked Danica if she had any advice for all of us or any special words of wisdom. She answered by saying that "mindset matters." If you think that you will fail, then you will probably fail. If you think that you will succeed, then you will probably succeed.

We wish Danica, her family, and her students the best of luck, and we thank Danica for sharing her stories and thoughts with us!

The Pseudo-Sum

By Larry Peterson

I hope you get a chance to read the notes about **Dr. Milton Winger** and **Mrs. Donna Boe** on page 2 of this issue of the *Math Log.* Dr. Winger served as a faculty member in the UND Mathematics Department for many years. He was the department Chair from 1984 to 1990. I first met Dr. Winger in 1989. I was working in private industry at the time, but I was planning to return to school for graduate work in mathematics. Dr. Winger and I first talked on the telephone, but a few weeks later, in the fall of 1989, I came to the UND campus for a visit. We met in Dr. Winger's office for a few minutes, where we discussed the graduate program in Mathematics here. Dr. Winger then took me through the department and introduced me to many of the people working here at the time. I remember visiting the "Math Lab" in the basement of Witmer Hall. The Math Lab was a study lab for students in UND's Intermediate Algebra course. When I returned home from my campus visit, I sensed that the Mathematics Department here at UND was a very welcoming department. I knew that graduate study would be a challenge, but I knew that I wanted to study here. A few months later, I moved to Grand Forks and began work on an M.S. degree in Mathematics.

Donna Boe served as a clerk in the Mathematics Department office until 2011. I would see her on a daily basis. One of Donna's occasional tasks was to help with the typing and mailing of the *Math Log* newsletter!

We will miss Dr. Winger and Mrs. Boe, but we are happy to have known them. We extend our best wishes to their families!

We also extend our best wishes to you! Feel free to send us news about your activities. Use the form on the next page, or send us news and updates by e-mail. Use the e-mail address given on the next page.

The following persons are responsble for monetary gifts to the UND Alumni Association specifically designated for the improvement of the Department of Mathematics. We thank you for your generosity!

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und.udmath@email.und.edu

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