

Bryce A. Christopherson

Assistant Professor of Mathematics

University of North Dakota

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Research interests. Ramsey theory and probabilistic thresholds; nonlinear control, feedback stabilization, and topological obstructions; sparse neural networks and lottery-ticket extraction.

Appointments

Assistant Professor of Mathematics

University of North Dakota, Department of Mathematics and Statistics

Aug. 2022–present

Research, teaching, graduate and undergraduate mentoring, and departmental leadership.

Senior Member of Technical Staff, Intelligence Innovation Group

The Aerospace Corporation, Strategic and Global Awareness Directorate

Mar. 2021–June 2024

Full-time through August 2022; casual appointment thereafter. Worked as a mathematician, machine-learning researcher, data scientist, and full-stack developer on national-security space systems. Co-developed the Digital Threat Model graph database for the U.S. Space Force digital-engineering effort, contributing across the back end and leading front-end development of tools to maintain, populate, and query the system.

Digital Engineering Intelligence Analyst, Threat Studies and Analysis Group

The Aerospace Corporation, Strategic and Global Awareness Directorate

Aug. 2020–Mar. 2021

Applied graph and game theory to acquisition and architecture decisions; developed mathematical, statistical, and AI/ML tools for threat analysis, data fusion, uncertainty resolution, and decision support.

Academic Professional Lecturer and Tutoring Director

University of Wyoming, Department of Mathematics and Statistics

Aug. 2019–Aug. 2020

Taught as instructor of record, coordinated grading for large-enrollment courses, and maintained web-based course offerings. Directed the university's flagship mathematics and statistics tutoring program, supporting a campus population of more than 9,000 undergraduates. Designed and delivered 30 CRLA tutor-certification workshops and 30 mathematics subject-matter competency sessions, coordinated all levels of CRLA certification, and launched the online tutoring center during the COVID-19 transition without interrupting service.

Graduate Teaching Assistant

University of Wyoming, Department of Mathematics and Statistics

Aug. 2015–Aug. 2019

Instructor of record and discussion-section instructor for undergraduate mathematics courses.

Education

Ph.D. in Mathematics

University of Wyoming

2019

Dissertation: *Stability in Common and Uncommon Places*. Advisor: Farhad Jafari.

M.S. in Mathematics

University of Wyoming

2017

B.A. in Mathematics and Economics

Augustana University

2015

Peer-Reviewed Publications

1. **Bryce A. Christopherson** and Jack Baretz. “When do the Kahn–Kalai bounds provide nontrivial information?” *Journal of Inequalities and Applications* **2025**, Article 23, 7 pp. [\[DOI\]](#) [\[arXiv\]](#)
2. **Bryce A. Christopherson**, Boris S. Mordukhovich, and Farhad Jafari. “Continuous feedback stabilization of nonlinear control systems by composition operators.” *ESAIM: Control, Optimisation and Calculus of Variations* **28** (2022), Article 30, 22 pp. [\[DOI\]](#) [\[arXiv\]](#)
3. **Bryce A. Christopherson**, Farhad Jafari, and Boris S. Mordukhovich. “A Variational Approach to Local Asymptotic and Exponential Stabilization of Nonlinear Systems.” *SN Operations Research Forum* **1** (2020), Article 5, pp. 1–27. [\[DOI\]](#) [\[arXiv\]](#)

Preprints

1. **Bryce A. Christopherson**, Jack Baretz, Darian Colgrove, and Salah Dandan. “Double-Scoring: Reliable Extraction of Strong Lottery Tickets.” Preprint, 46 pp. (2026). [\[arXiv:2607.20555\]](#) [\[UND repository\]](#)
2. **Bryce A. Christopherson** and Farhad Jafari. “Brockett Openness Profiles and Gain-Limited Feedback Stabilization.” Preprint, 15 pp. (2026). [\[arXiv:2602.17847\]](#)
3. **Bryce A. Christopherson** and Casia Steinhaus. “Bounds on the Threshold Ramsey Multiplicity of Ramsey Numbers with Many Colors.” Preprint, 12 pp.; revised 2026. [\[arXiv:2501.18869\]](#)
4. **Bryce A. Christopherson**. “Ramsey-Theoretic Characterizations of Classically Non-Ramseyian Problems.” Preprint, 22 pp. (2025). [\[arXiv:2502.04311\]](#)
5. **Bryce A. Christopherson** and Darian Colgrove. “Conditional Park–Pham Bounds under Positive Correlation.” Preprint, 7 pp.; revised 2026. [\[arXiv:2402.17872\]](#)

Technical Reports

1. **Bryce A. Christopherson**, Dido Salazar, and Robert Nelson. “Artificial Intelligence and Machine Learning Approaches for Enhanced SDA.” Project West Wing Technical Operating Report TOR-2021-02533, The Aerospace Corporation, 22 pp. (2021).
2. Robert Nelson and **Bryce A. Christopherson**. “Digital Threat Model Verification & Validation.” Project West Wing Technical Operating Report TOR-2021-00810, The Aerospace Corporation, 17 pp. (2021).

Funded Grants and Sponsored Projects

Conduct Market Research/Discovery for Advanced Technology for the Department of War (DoW)

APEX / U.S. Department of Defense; Co-Principal Investigator

May–Dec. 2026

Total award: \$475,000. Supports market research and technical assessment of emerging technologies for compatibility with government requirements. The project considers solution maturity, integration, security and risk, workforce needs, and pathways to adoption and technology transition.

MACRO Task Order (autonomous UAS platform and mission-behavior development)

MACRO program; prime contractor: ARA; government customer: PEO Soldier / PM SWAR; Co-Principal Investigator

2026

Total award: \$899,938. Supports development and integration of autonomous aerial platforms and mission-planning software for coordinated robotic systems, including robust platform design, feasibility and navigation services, distributed search and swarm behaviors, and field validation.

Conference: 2025 Midwest Optimization Meeting (NSF DMS-2526465)

National Science Foundation; Co-Principal Investigator

Oct. 2025–Sept. 2026

Total award: \$31,200. Supported a regional optimization conference at the University of North Dakota attended by approximately 80 people.

Development of Advanced Propulsion and Orbit Management Technologies for the Deployment and Operation of Constellation of Low Earth Orbit Satellites

University of North Dakota Early Career Scholars Program; Co-Principal Investigator, 2024 cohort
Total award: \$30,000.

2024

S-STEM: Improving Outcomes for Talented Undergraduate STEM Students through Experiential Science Training (QUEST)

National Science Foundation Award 2424922; supporting faculty and research mentor

Apr. 2025–Mar. 2030

Total award: \$1,999,497. The Question-based Undergraduate Experiential Science Training program supports talented STEM students with financial need through scholarships, academic mentoring, and research experiences.

Honors, Awards, and Nominations

- 2025

Distinguished Faculty of the Month

University of North Dakota Athletics
- 2024

Mathematics REU Program Project Research Award

University of North Dakota

Provided departmental support for a faculty-led undergraduate research project.
- 2024

Early Career Scholars Program Research Award

University of North Dakota

Supported an interdisciplinary early-career research project.
- 2021

SPOT Award for Outstanding and Distinguished Contributions

The Aerospace Corporation

Received a director-nominated award recognizing outstanding individual contributions.
- 2020

Promoting Intellectual Engagement in the First Year Award – nominee

University of Wyoming

Nominated by students for teaching that promoted intellectual engagement in the first year.
- 2019

John P. Ellbogen Outstanding Graduate Assistant Teaching Award – nominee

University of Wyoming

Nominated by the department for graduate-assistant teaching.
- 2018

Catherine Gibbs Shaw Fund Mathematics Award

University of Wyoming, Department of Mathematics and Statistics

Recognized excellence in mathematics.

Research Advising and Mentoring

Graduate students

- 2026–present

Jack Baretz, M.S. thesis advisee
- 2026–present

Darian Colgrove, M.S. thesis advisee
- 2025

Jonathan Wirkkala, M.S. thesis advisee

Thesis: *Forceful Functors: A Categorical Approach to Constraint Monitoring in Machine Learning Models*. [\[thesis\]](#)

- 2025

Ganesha Thondilege, M.S. thesis advisee

Thesis: *AdaptBlur: Adaptive Linear Filter for Enhanced Deep Learning Classification Performance*. [\[thesis\]](#)
- 2025

Daniel Atta Kwakye, M.S. thesis advisee

Thesis: *Thresholds in Modular Lattices*. [\[thesis\]](#)
- 2025

Tunde Alesinloye, M.S. thesis advisee

Thesis: *Mathematical Modeling of Cyber-Physical Attacks in IoT Systems: An Epidemiological Approach*. [\[thesis\]](#)

Undergraduate research group

- 2023–present

Casia Steinhaus.
- 2023–2026

Jack Baretz.
- 2024–2026

Salah Dandan.
- 2025–present

Taylor Valdez.
- 2024

Augustus Tandberg, Gabrielle Wahl, and Martin Epstein.
- 2024–2025

Liam Turman and Josh Dorsam.

Additional research mentoring

- 2024

Faculty project mentor, UND Mathematics REU Program

Led an undergraduate research project supported by the Mathematics REU Program Project Research Award.
- 2023–2025

Faculty Advisory Committee member for two Ph.D. students

Murat Parlaksisik (Computer Science) and Njei Teckla Tifuh (Chemistry), University of North Dakota.

Teaching Experience

Scheduled teaching

TERM	COURSE	TITLE	ROLE / FORMAT
Spring 2027	MATH 516	Applied Mathematics	Instructor of record on campus
Fall 2026	MATH 515	Applied Mathematics: Nonlinear Dynamics	Instructor of record on campus
Fall 2026	MATH 330	Proof, Set Theory, and Logic	Instructor of record on campus
Fall 2026	MATH 330	Proof, Set Theory, and Logic	Instructor of record online

University of North Dakota

TERM	COURSE	TITLE	ROLE / FORMAT
Spring 2026	MATH 442	Linear Algebra	Instructor of record on campus
Fall 2025	MATH 330	Proof, Set Theory, and Logic	Instructor of record on campus
Fall 2025	MATH 330	Proof, Set Theory, and Logic	Instructor of record online
Fall 2025	MATH 266	Elementary Differential Equations	Instructor of record on campus

Spring 2025	MATH 442	Linear Algebra	Instructor of record on campus
Spring 2025	MATH 442	Linear Algebra	Instructor of record online
Spring 2025	MATH 266	Elementary Differential Equations	Instructor of record on campus
Fall 2024	MATH 266	Elementary Differential Equations	Instructor of record on campus
Spring 2024	MATH 442	Linear Algebra	Instructor of record on campus
Spring 2024	MATH 442	Linear Algebra	Instructor of record online
Spring 2024	MATH 505	Seminar in Mathematics: Control Theory	Instructor; graduate readings course
Fall 2023	MATH 461	Numerical Analysis	Instructor of record on campus
Spring 2023	MATH 442	Linear Algebra	Instructor of record on campus
Fall 2022	MATH 208	Discrete Mathematics	Instructor of record on campus

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TERM	COURSE	TITLE	ROLE / FORMAT
Spring 2022	MATH 4230	Introduction to Complex Analysis	Instructor of record online
Spring 2020	MATH 2200	Calculus I	Instructor of record transitioned online
Fall 2019	MATH 1450	Algebra and Trigonometry	Instructor of record on campus
Fall 2019	MATH 2200	Calculus I	Instructor of record on campus
Summer 2019	MATH 2350	Business Calculus	Instructor of record on campus
Spring 2019	MATH 2250	Elementary Linear Algebra	Instructor of record on campus
Fall 2018	MATH 2200	Calculus I	Instructor of record on campus
Summer 2018	MATH 1000	Problem Solving	Instructor of record on campus
Summer 2018	MATH 2350	Business Calculus	Instructor of record on campus
Spring 2018	MATH 2210	Calculus III	Discussion-section instructor on campus
Fall 2017	MATH 2205	Calculus II	Discussion-section instructor on campus
Summer 2017	MATH 2350	Business Calculus	Instructor of record on campus
Spring 2017	MATH 1400	College Algebra	Discussion-section instructor on campus

Fall 2016	MATH 1400 College Algebra	Discussion-section instructor on campus
Summer 2016	MATH 1000 Problem Solving	Instructor of record on campus
Fall 2015	MATH 1450 Algebra and Trigonometry	Instructor of record on campus

Online teaching and educational media

Developed and delivered separate fully online sections of MATH 442 (spring 2024 and spring 2025) and MATH 330 (fall 2025), supported by original lecture videos and digital course materials. From Aug. 15, 2024, through Aug. 14, 2025, the [public mathematics video channel](#) recorded approximately 259,000 views and 4,200 hours of watch time. Earlier online experience includes moving Calculus I and the University of Wyoming mathematics and statistics tutoring center online during the spring 2020 COVID-19 transition and teaching MATH 4230 fully online in spring 2022.

Research and Scholarly Presentations

- 2026** *Bounds on the Critical Multiplicity of Ramsey Numbers with Many Colors (with Casia Steinhaus)*
AMS Spring Central Sectional Meeting, Special Session on Computational Combinatorics III, North Dakota State University, Fargo, ND.
- 2026** *A Refinement in Čech Cohomology of Coron's Necessary Condition*
Topics in Pure and Applied Mathematics Seminar, University of North Dakota.
- 2026** *Stabilization of Nonlinear Systems by Gain-Limited Feedback Laws*
Topics in Pure and Applied Mathematics Seminar, University of North Dakota.
- 2025** *Reliable Extraction of Strong Lottery Tickets in Neural Networks*
Midwest Optimization Meeting, University of North Dakota.
- 2025** *Reliable Extraction of Strong Lottery Tickets in Neural Networks (with Jack Baretz, Darian Colgrove, Daniel Kwakye, Martin Epstein, and Salah Dandan)*
Joint MAA North Central Section and MinnMATYC Fall Meeting, Concordia University, St. Paul, MN.
- 2024** *When Do the Kahn–Kalai Bounds Provide New Information?*
Topics in Pure and Applied Mathematics Seminar, University of North Dakota.
- 2024** *Local Quotient Maps*
Topics in Pure and Applied Mathematics Seminar, University of North Dakota.
- 2023** *An Introduction to Comma Categories and Slice Categories with Examples*
Topics in Pure and Applied Mathematics Seminar, University of North Dakota.
- 2023** *A Primer on Lyapunov Theory*
Topics in Pure and Applied Mathematics Seminar, University of North Dakota.
- 2023** *An Extension of the Kahn–Kalai Bounds*
Topics in Pure and Applied Mathematics Seminar, University of North Dakota.
- 2023** *Some Algebraic Techniques for Ramsey Theory*
MAA North Central Section Fall Meeting, University of Minnesota Duluth.

- 2023** *Some Algebraic Techniques for Ramsey Theory*
Topics in Pure and Applied Mathematics Seminar, University of North Dakota.
- 2023** *The Feedback Stabilization Problem and Local Sections*
Topics in Pure and Applied Mathematics Seminar, University of North Dakota.
- 2023** *Stability: From Basketballs to Big Stuff*
Elevating Mathematics Video Competition, Board on Mathematical Sciences and Analytics, National Academies; virtual.
- 2022** *Expectation Thresholds and the Lottery Ticket Hypothesis*
Physics & Astrophysics Colloquium, University of North Dakota.
- 2022** *Expectation Thresholds and the Lottery Ticket Hypothesis*
MAA North Central Section Fall Meeting, University of North Dakota.
- 2021** *Understanding Upside-Down Reinforcement Learning*
Reinforcement Learning Colloquium, Data Science & Artificial Intelligence Group, The Aerospace Corporation.
- 2020** *Integrated Digital Engineering Prototyping Testbed Hub: Markovian Techniques for Mission Thread Analysis in Support of Acquisitions Decisions*
Systems Engineering Forum, Computer Applications & Assurance Subdivision, The Aerospace Corporation.
- 2020** *An Introduction to Extremal Graph Theory in Intelligence Applications*
Space Launch and Intelligence Colloquium, Strategic & Global Awareness Directorate, The Aerospace Corporation.
- 2018** *Variational Characterizations of Local Asymptotic and Exponential Stabilizability*
Von Neumann Seminar in Analysis, University of Wyoming.
- 2018** *A K-Theory for Combinatorial Games*
Graduate Presentations in K-Theory, University of Wyoming.
- 2017** *Local Asymptotic Stabilizability and the Smoothness of Stabilizing Controls*
Von Neumann Seminar in Analysis, University of Wyoming.
- 2017** *Regularity of Linear Elliptic and Parabolic Solutions: A Weakening of the Lipschitz Condition*
Graduate Presentations in Partial Differential Equations, University of Wyoming.
- 2017** *Trace Parameterization of Nonnegative Hermitian Trigonometric Polynomials: A Control Theory Perspective*
Graduate Presentations in Harmonic Analysis, University of Wyoming.
- 2016** *The Combinatorial Game of Nim on Graphs*
Graduate Research Seminar, University of Wyoming.
- 2015** *Nim on Tree Graphs*
Pi Mu Epsilon Student Paper Session, MAA MathFest, Washington, DC.
- 2015** *The Combinatorial Game of Nim on Trees*
Arthur Olsen Student Research Symposium, Augustana College.
- 2015** *Geometric Connections between Graphical and Integer Ramsey Theory: What Can van der Waerden Numbers Tell Us About Congressional Infighting?*
Math on the Northern Plains, MAA Regional Undergraduate Mathematics Conference, Dordt College.

- 2015** *The Combinatorial Game of Nim on Trees*
Math on the Northern Plains, MAA Regional Undergraduate Mathematics Conference, Dordt College.
- 2014** *Edge Nim on Trees (with Lindsay Erickson)*
MAA North Central Section Fall Meeting, North Dakota State University, Fargo, ND.

Academic and Professional Service

University and departmental leadership

- 2025–2028** **Student Academic Appeals Committee**
College of Arts & Sciences, University of North Dakota
- 2025–2028** **University Senate Essential Studies Committee**
University of North Dakota
- 2023–present** **Executive Committee Member and Chair**
Department of Mathematics and Statistics, University of North Dakota
Served as member in 2023–2024 and chair from 2024 to the present. Contributes to departmental governance, planning, and search and hiring work.
- 2024–present** **Applied Mathematics Committee**
Department of Mathematics and Statistics, University of North Dakota
Plans applied-mathematics activities, research groups, proposal coordination, and interdisciplinary collaboration.
- 2024–present** **Colloquium Committee**
Department of Mathematics and Statistics, University of North Dakota
- 2024–present** **Math Club Faculty Advisor**
Department of Mathematics and Statistics, University of North Dakota
- 2023–present** **Departmental Seminar Series Organizer**
Department of Mathematics and Statistics, University of North Dakota
Coordinates the weekly research seminar, including speaker invitations, scheduling, announcements, and hosting.
- 2023–2024** **Curriculum Review Committee**
Department of Mathematics and Statistics, University of North Dakota
Reviewed the department's B.S., teacher-licensure, M.S., and M.Ed. curricula and recommended updates.
- 2022–2024** **Assessment Committee Member and Chair**
Department of Mathematics and Statistics, University of North Dakota
Served as member in 2022–2023 and chair in 2023–2024. Requested, reviewed, and assessed teaching data under the departmental assessment plan.
- 2023** **Department Representative, Arts and Sciences Major/Minor Fair**
University of North Dakota

Search committees

- 2026** **Tenure-Track Assistant Professor Search Committee**
Department of Mathematics and Statistics, University of North Dakota
- 2026** **Non-Tenure-Track Teaching Professor Search Committee**
Department of Mathematics and Statistics, University of North Dakota
- 2024–2025** **Teaching Assistant Professor Search Committees – three searches**
Department of Mathematics and Statistics, University of North Dakota
- 2023–2024** **Administrative Secretary Search Committee**
Department of Mathematics and Statistics, University of North Dakota
- 2023–2024** **Tenure-Track Assistant Professor of Applied Mathematics Search Committee**
Department of Mathematics and Statistics, University of North Dakota
- 2023–2024** **Teaching Assistant Professor Search Committee – Math Active Learning Lab focus**
Department of Mathematics and Statistics, University of North Dakota
- 2023–2024** **Teaching Assistant Professor Search Committee – Self-Paced Enroll Anytime focus**
Department of Mathematics and Statistics, University of North Dakota
- 2023–2024** **Teaching Assistant Professor of Mathematics Search Committee**
Department of Mathematics and Statistics, University of North Dakota

Professional service and conference organization

- 2025** **Co-organizer, Midwest Optimization Meeting**
University of North Dakota
Co-organized a regional conference attended by approximately 80 people, supported by NSF DMS-2526465.
- 2024, 2025** **Ad hoc referee, two manuscripts**
The Electronic Journal of Combinatorics
Reviewed two manuscripts.
- 2022–2024** **UND Math Track Meet Exam Writer**
University of North Dakota
Wrote examinations for the 2022, 2023, and 2024–25 UND Math Track Meets.
- 2023** **Panelist, “Promise & Peril of AI in Higher Education”**
University of North Dakota

Outreach, student support, and professional development

- 2024** **Workshop Leader, “Möbius Strip Magic”**
University of North Dakota
Led a hands-on activity for Valley Middle School seventh-graders during UND’s first BrainSTEM event, which focused on populations underrepresented in STEM.
- 2022–2023** **Alice T. Clark Scholars Mentoring Program Participant**
University of North Dakota

- 2019–2020** **CRLA Tutor Certification Training Coordinator**
 University of Wyoming
 Designed and led 30 weekly sessions on tutoring practice and pedagogy and coordinated certification preparation.
- 2019–2020** **Mathematics Tutor Subject-Matter Competency Training Coordinator**
 University of Wyoming
 Designed and led 30 weekly sessions covering the undergraduate mathematics curriculum for CASM and STEP tutors.
- 2020** **Professional Development Workshop Speaker**
 University of Wyoming
 Presented “Job Searches, Building Your Professional Network, and CV/Resume Writing” and supplied custom $\LaTeX$ templates and job-search materials.
- 2019** **Professional Development Workshop Speaker**
 University of Wyoming
 Presented “Effective Grading for Large Enrollment Courses,” covering rubric design, efficient workflow, fairness, feedback, and transparency.
- 2018** **Summer Mathematics Tutor and Incoming Graduate Student Mentor**
 University of Wyoming
 Supported undergraduate tutoring and prepared incoming graduate students for mathematics entrance examinations.
- 2015** **Math Mentor, Fabulous Friday Educational Outreach Program**
 Mark Twain Elementary School, Sioux Falls, South Dakota
 Led hands-on graph-theory activities for second- and third-grade students.

Research Computing and Teaching Technology

Research computing: Python, PyTorch, TensorFlow/Keras, NumPy, SciPy, pandas, scikit-learn, SymPy, MATLAB, Mathematica, JavaScript, Neo4j, Git, and $\LaTeX$.

Methods: numerical experimentation, neural-network training and pruning, scientific visualization, graph computation, and reproducible research workflows.

Online instruction and educational technology: Canvas, Blackboard, Moodle, WeBWorK, Pearson MyLab Math, XYZ Homework, OpenStax Rover, recorded-lecture production, online tutoring operations, and interactive instructional graphics.

Professional Memberships

American Mathematical Society; Mathematical Association of America.