

Noah Lars Braeger

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Education

Bachelor of Science (B.S.) in **Mathematics** - May 2021

Summa Cum Laude

Utah State University, Logan, Utah, USA

Bachelor of Science (B.S.) in **Physics** - May 2021

Summa Cum Laude

Utah State University, Logan, Utah, USA

Ph.D. in **Mathematics** - May 2026

University of Pennsylvania, Philadelphia, Pennsylvania, USA

Relevant Experience and Coursework

Programming Languages

Python, Mathematica, Maple, Linux.

Graduate Coursework - Mathematics

Complex Analysis, Real Analysis, Functional Analysis, Algebraic Topology, Introduction to Smooth Manifolds, Algebraic Curves and Surfaces, Number Theory, Topological K-Theory, Complex Algebraic Geometry, and Algebra.

Undergraduate Coursework - Physics

Intermediate Classical Mechanics, Electromagnetism, Optics, and Intermediate Physics Lab.

Graduate Coursework - Physics

Astrophysics and the standard model, general relativity, quantum mechanics, and gauge theory.

Teaching and Work Experience

National Science Foundation Graduate Research Fellowship Workshop Mentor

Utah State University, Logan, Utah.

August 2021 - December 2021

Advised a team of three senior undergraduates applying for the National Science Foundation Graduate Research Fellowship.

Director's Summer Program Intern

National Security Agency, Washington D.C.

May 2021 - August 2021

- Developed probabilistic models that analyzed the security of Random Forest Classifiers and verified such models by performing statistical experiments using Python and Python's machine learning package scikit-learn.
- Compiled findings into a co-authored internally refereed research paper.
- Presented findings to the Institute for Defense Analyses at the Princeton Center for Communications Research and the Director of the National Security Agency.

Grader

Utah State University, Logan, Utah.

August 2018 - December 2018, January 2021 - May 2021

Responsible for grading weekly homework assignments and holding regular office hours.

- Spring 2021, Differential Geometry, Math 5110.

- Fall 2018, Calculus I, Math 1220

Recitation Leader

Utah State University, Logan, Utah.

January 2019 - May 2021

Responsible for teaching supplementary classes twice a week for groups of approximately thirty students, grading assignment and exams, answering student questions, and holding regular office hours.

- Spring 2019, Introduction to Linear Algebra, Math 2270, Sections 504 & 506.

- Fall 2019, Multivariable Calculus, Math 2210, Section 505.

- Spring 2020, College Algebra, Math 1050, Section 501.

- Fall 2020, Calculus II, Math 1220, Sections 502 & 503.

- Spring 2021. Calculus II, Math 1220, Section BFPY.

Teacher's Assistant

Utah State University, Logan, Utah.

May 2018 - June 2019

Responsible for grading weekly research essays, managing the course Canvas page, and hosting regular review sessions.

- Summer 2018, Fall 2018, Spring 2019, and Summer 2019, Great Scientists, Physics 3020.

Classroom Aide

Mt. Logan Middle School, Logan, Utah.

August 2018 - December 2018

Worked with students who needed additional instruction in their mathematics courses and discussed their progress with their instructor.

Private Tutor

Utah State University, Logan, Utah.

May 2018 - December 2018

Provided individual instruction to three Freshmen undergraduate students in college algebra, calculus, and linear algebra.

Publications

- Braeger, N., Malmendier, A., Sung, Y., (2020). "Kummer sandwiches and Greene-Plesser construction." J. Geom. Phys., 154:103718, doi:10.1016/j.geomphys.2020.103718.

- Braeger, N., Clinger, A., Malmendier, A., Spatig, S., (2021). "Isogenies of Certain K3 Surfaces of Rank 18." Res. Math. Sci., 8:57, doi:10.1007/s40687-021-00293-0.

Presentations and Workshops

- MSRI Summer Graduate School in Tropical Geometry, St. Mary's College, Moraga, CA, 2022.

- Braeger, N. and Malmendier, A. "An Isogeny Between Certain K3 Surfaces of Picard Rank 18." *Joint Mathematics Meetings*, Washington, DC, January 2021.
- Braeger, N. "Clifford Algebras." *Learning Seminar on K-Theory*, Logan, UT, October 2020.
- Braeger, N. "Counting Rational Points on Families of K3 Surfaces." *Southwestern Undergraduate Mathematics Research Conference*, Fort Collins, CO, April 2020. Unable to deliver; meeting cancelled due to COVID-19 outbreak.
- Braeger, N. "Counting Rational Points on Curves and Surfaces." *University of Utah Undergraduate Colloquium*, Salt Lake City, UT, November 2019.
- Braeger, N. and Malmendier, A. "Mirror Symmetry for Multi-Parameter K3 Surfaces." *2019 Annual Meeting of the Four Corners Section*, Prescott, AZ, October 2019.
- Braeger, N. "What are Kummer Surfaces?" *Explicit Methods for Abelian and K3 Varieties*, Logan, UT, July 2019.

Research Grants

National Science Foundation Graduate Research Fellowship

University of Pennsylvania, May 2021 - May 2026

Five-year fellowship, which includes three years of financial support consisting of an annual stipend of \$34,000 and a cost of education allowance of \$12,000, to pursue graduate research in mathematics.

Council of Undergraduate Research and Goldwater Scholarship Foundation Summer Research Fellow

Utah State University, May 2019 - August 2019

\$2000 fellowship awarded to make substantial progress in developing a natural extension of the Greene-Plesser procedure and counting the number of rational points on a certain 3-parameter family of K3 surfaces.

College of Science Minigrant

Utah State University, May 2019 - August 2019

\$1000 fellowship awarded to make substantial progress in developing a natural extension of the Greene-Plesser procedure and counting the number of rational points on a certain 3-parameter family of K3 surfaces.

Undergraduate Research and Creative Opportunities (URCO) Grant

Utah State University, August 2019 - August 2020

\$1000 fellowship awarded to complete the results produced under the College of Science Minigrant fellowship and the Council of Undergraduate Research and Goldwater Scholarship Foundation fellowship.

Awards & Honors

2021

Robins Award - Undergraduate Researcher of the Year, Utah State University

Regarded as the most coveted of all Utah State honors with the awards night being the year's most prestigious event. Awarded at the university level to an undergraduate student who demonstrates superior achievement in research.

Undergraduate Researcher of the Year, Utah State University College of Science

Awarded at the college level to an undergraduate student who demonstrates superior achievement in research

Undergraduate Researcher of the Year, Utah State University Department of Mathematics & Statistics

Awarded at the departmental level to an undergraduate mathematics major that demonstrates superior achievement in research.

David and Terry Peak Outstanding Achievement Award in Physics, Utah State University Department of Physics

Awarded annually to an undergraduate or graduate student majoring in physics in recognition of outstanding academic, research, teaching, or service achievement.

2020

Science Senator Scholarship, Utah State Student Involvement and Leadership Center

Awarded annually to the student elected science senator whose main purpose is to represent undergraduate and graduate students in the College of Science.

Neville & Annie Hunsaker Scholarship, Utah State University Department of Mathematics & Statistics.

Awarded on a basis of superior academic achievement and potential for service to society.

Charles & Leah Hendricks Award, Utah State University Department of Physics

Awarded on an annual basis to Juniors with superior academic merit, professional potential, and personal integrity.

Undergraduate Researcher of the Year, Utah State University Department of Mathematics & Statistics

Awarded on the departmental level to an undergraduate mathematics major that demonstrates superior achievement in research.

Outstanding Undergraduate Mathematics Award, Utah State University Department of Mathematics & Statistics

Awarded on an annual basis to a Junior or Senior level mathematics major that demonstrates superior achievement in research and coursework.

2019

Goldwater Scholarship Nominee, Utah State University

Awarded on a competitive basis to four undergraduate student researchers that have demonstrated superior achievement in research. Nominees compete for the national Goldwater Scholarship award.

O. Harry Otteson Award, Utah State University Department of Physics

Awarded to the physics major achieving the highest score in general physics.

Arthur van Vliet Scholarship, Utah State University Department of Mathematics & Statistics

Awarded on a basis of superior academic achievement and financial need.

Charles & Ray Perkins Scholarship, Utah State University College of Science

Awarded to an outstanding Junior or Senior having a major within the College of Science.

USUSA Director Scholarship, Utah State University Student Involvement and Leadership Center

Awarded to an outstanding undergraduate student involved in student government activities as a member of committees, boards, councils, clubs, or other organizations.

“A” Pin Award, Utah State University

Awarded to full-time students who maintain a 4.0 grade point average for two consecutive semesters.

Inducted into Sigma Pi Sigma Honorary Society, Utah State University.

2018

Martha Hoyt Scholarship, Utah State University

Awarded on a competitive basis to an undergraduate student with a 3.0 GPA.

Utah State Class of "27" Fund, Utah State University

Awarded to an undergraduate student who demonstrates high scholastic achievement and success in student activities.

"A" Pin Award, Utah State University

Awarded to full-time students who maintain a 4.0 grade point average for two consecutive semesters.

2017

"A" Pin Award, Utah State University

Awarded to full-time students who maintain a 4.0 grade point average for two consecutive semesters.

2016

Sons of Utah Pioneers Scholarship, National Society of the Sons of Utah Pioneers

Awarded to Freshman undergraduate students who have skills and motivation to succeed in college and have overcome significant personal challenges in their lives.

Regents Scholarship, Utah State University

Awarded to Freshman undergraduate students who earned at least a 3.3 cumulative GPA in high school and composite score of at least twenty-two on the ACT.

Organization Memberships

TEDxUSU Unity Head Organizer

May 2020 - May 2021

Led a diverse team that oversaw the preparation and production of seven TEDx talks, all ticketing and venue planning, the creation of a website for event information, the designing of promotional materials, the arrangement of contracts for an out of state speaker and musician, and a catered dinner event for all attendees.

Utah State College of Science Senator

May 2020 - May 2021

Responsible for the oversight of all events organized by the College of Science. Additionally, I advocated for the interests of the college's undergraduate and graduate students and contributed to the development of a college-wide mentorship program.

Utah State University Sustainability Fee Committee Chair

May 2020 - May 2021

As committee chair, I helped write a proposal with the associate director of Utah State's Center for Community Engagement for an increase in students fees. The additional funds were to be allocated to organizations at Utah State such as SNAC and the Gleaning Team.

Utah State Science Council President

May 2019 - May 2020

Responsible for leading a group of twenty-five undergraduate student volunteers from the College of Science. We organized undergraduate research symposiums, networking events to encourage students to meet with college alumni, and social events aimed at integrating new students into college life. In addition, we hosted a canned food drive that benefited the Cache Community Food Pantry.

Utah State College of Science Ambassador

August 2018 - May 2021

As an ambassador, I represented the College of Science and its five departments at various university and college functions. I volunteered at student recruiting events, alumni and guest functions, and other special events like Science Unwrapped, a public outreach program sponsored by Utah State.

Volunteer at the English Language Center of Cache Valley

May 2019 - December 2019

The English Language Center of Cache Valley teaches English, basic life skills, U.S. Citizenship preparation, and employment education to adult speakers of other languages. I served as a classroom aide, which, under the direction of an instructor, involved helping students with pronunciation, conversation skills, and writing.

Member of the Utah State University Society of Physics Students

August 2016 - May 2018

As a member of this organization, I regularly provided physics demonstrations to students and members of the community at Utah State's monthly Science Unwrapped event. I also helped organize and run STEM nights at many of the elementary and middle schools located throughout Cache Valley.