# Eric R. Binnendyk

Bachelor of Science, Mathematics and Computer Science
New Mexico Institute of Mining and Technology

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## Personal statement

I have always had a deep passion for mathematics and am particularly drawn to the theoretical aspects of my studies, such as formal logic, set theory, and complexity theory. At Tech, I've done independent research into topics such as primitive recursion and lambda calculus and studied the theories of machine learning and cryptography in depth. In the near term, I want to pursue a PhD in theoretical CS to learn more about the limits of different computational models as well as the conditions sufficient to prove a complexity class can be learned or contains pseudorandomness. My long term goal is to work in a research lab or university researching theoretical computer science and developing algorithms and complexity proofs.

## Education

### New Mexico Institute of Mining and Technology
- May 2022          MS in Computer Science (expected)
- May 2021          BS in Computer Science with highest honors
- May 2021          BS in Mathematics with highest honors

## Research experience and publications

- Marco Carmosino, R. Ramyaa, Antonina Kolokolova, Manuel Sabin, Eric Binnendyk. Learning with distributional inverters. To be presented at the *33rd International Conference on Algorithmic Learning Theory, 2022*. Paper.
- Binnendyk, Eric R. Pseudo-random functions and uniform learnability. *Electronic Colloquium on Computational Complexity*. October 2021. Paper.
- Currently conducting research for my MS thesis on named-data networking and smart grid security under the guidance of Jun Zheng. This work is undertaken as part of the NM EPSCoR program funded by an NSF grant. My focus is on the use of reinforcement learning to improve network performance and security using ns-3 and OpenGym. (presentation forthcoming at the NMT Student Research Symposium in April 2022)
- Binnendyk, Eric R. Pseudo-random functions and uniform learnability. 2021. Senior honors thesis. Committee: R. Ramyaa (advisor), Marco Carmosino, Antonina Kolokova, Subhasish Mazumdar, Jun Zheng. Paper.
- Binnendyk, Eric R. A uniform dichotomy between pseudorandom functions and learnability. 2021. Department Showcase presentation at the NMT Student Research Symposium. Advisor: R. Ramyaa. Slides.
- Binnendyk, Eric R. A New Method for Finding Roots of Unity by Finding Radical Expressions For Arbitrary Members Of The Cyclotomic Field and Its Extensions. 2020. Poster presentation at the NMT Student Research Symposium. Advisor: Mingji Zhang. Paper, poster.

- Binnendyk, Eric R. Exploration of Stable Cycles in Dynamical Systems. 2019. Oral/slide presentation at the NMT Student Research Symposium. Advisor: R. Ramyaa. [Paper](#), [slides](#).

## Awards and distinctions

- 2021 NMT Alumni Award - Top Computer Science graduate
- 2021 NMT Computer Science & Engineering Department High Achievement Award
- 2018-2021 NMT Tech Scholar (honors) - 3.96/4.0 GPA
- 2021 John W. Shipman Award, endowed scholarship
- 2020 Goldwater Scholarship nominee
- 2019 NMT math department slide rule competition winner
- 167 Quantitative/165 Verbal GRE
- 2016 National Merit Finalist

## Employment

**Research assistant - NMT Human Centered Computing and Security Lab** - Conducted research into named-data networking and smart grid security under the guidance of Prof. Jun Zheng as part of the NM EPSCoR program funded by an NSF grant. Surveyed and assessed current research and coded simulations of effective attack mitigation. (2020 - present)

**Teaching assistant - NMT Computer Science and Engineering department** - Graded assignments, maintained records, and tutored students for the NMT course Design and Analysis of Algorithms taught by Dr. Subhasish Mazumdar. (Fall 2021)

**Tutor - NMT Office for Student Learning** - Tutored students on mathematics and computer science and oversaw test corrections. Completed extensive training to be certified by the College Reading & Learning Association. (2019-2020)

**Grader - NMT Computer Science and Engineering department** - Graded assignments and tests for the NMT course Foundations of Computer Science taught by Dr. Ramyaa. Maintained student records on Canvas. (Fall 2019)

**Webmaster - NMT Department of Academic Affairs** - Coordinated the migration of web pages from old templates to a new standard. Edited HTML/CSS and dealt with version control using OmniUpdate. (2018)

## Other activities

**NMT Cybersecurity Club** - Participate in hands-on activities in computer security, networking, and other activities while learning about the role of cybersecurity in the modern world. (2019 - 2020)

**Competition judge/supervisor** - Volunteered at the New Mexico State science fair and the State Science Olympiad. Assessed middle and high school projects. (2018)

In my spare time I enjoy making models of polytopes using zome tools and origami and interacting with other hobbyists in online discussion forums about higher-dimensional geometry and cellular automata.