Madison Crim

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EDUCATION

Rutgers University, New Brunswick, NJ
Doctor of Philosophy (Ph.D.) Mathematics (Expected Graduation May 2026)
Cumulative GPA: 3.9

Rutgers University, New Brunswick, NJ
Master of Science (M.S.) Mathematics (Awarded May 2023)
Cumulative GPA: 3.9

Salisbury University, Salisbury, MD
Bachelor of Science (B.S.) Mathematics (Awarded May 2021) - Magna Cum Laude
Major GPA: 4.0 | Cumulative GPA: 3.7

Awards & Honors

- Presidential Scholarship – Fall 2017
- Dean's List Fall 2018 – Spring 2021
- Department Honors in Mathematics – Spring 2021
- Most Promising Mathematician – Spring 2021
- Member of Pi Mu Epsilon – Spring 2021 to Present

Extracurricular Activities

- Women in Tech Volunteer Spring 2020

RESEARCH EXPERIENCE

Rutgers University, New Brunswick, NJ — Ph.D. Candidacy
March 2024 - Present
Advised by Prof. Alex Kontorovich

Contributions to Mathlib:

- Formalized results on the localization of a finite direct product of commutative semirings.
  Link to PR #19042 (localization of finite direct product is a product of localizations)
- Characterized a commutative semiring with a maximal nilradical as a local ring.
  Link to PR #17549 (ring with maximal nilradical is a local ring)
- Showed that the localization map is surjective for finite direct products where each semiring has maximal nilradical.
  Link to PR #26372 (localization of a finite direct product where each semiring has maximal nilradical)

Contributions to Formalizing Fermat's Last Theorem (FLT):

- Verified that the canonical map from the product of completions of a number field to that of a finite extension is a base field algebra homomorphism.
  Link to PR #270 (map from prod_v K_v to prod_w L_w)
- Proved an isomorphism between the tensor product of the extension field with the product of base field completions and the product of completions of the extension field.
  Link to PR #385 (tensor product L(x)[K] commutes with arbitrary products if L/K is finite)
- Confirmed that tensoring with a finitely presented module commutes with arbitrary direct products.
  Link to PR #527 (tensor product distributes over direct products for finitely presented modules)

Contribution to Formalizing Local Class Field Theory:

- Established continuity of the scalar action of a non-Archimedean local field on its algebraic non-Archimedean local field extension, where the base field valuation is induced by the extension.
  Link to PR #2 (continuous action of K on L)

Summer@ICERM (REU), Providence, RI — Undergraduate Student Research
June 2020 - July 2020

- Conducted computational mathematics research on the use of randomness to efficiently compute kernel matrices and low-rank approximations.
- Worked with two other undergraduate students to solve problems and find new research paths.
- Learned python coding in order to conduct mathematical experiments.
- Co-authored a research paper and created a website that displays our coding investigations.
- Presented research results at the end of the summer program.
- Presented results at the SUMS conference at James Madison University in December 2020.

Research Paper: https://arxiv.org/abs/2008.04552
Website for my research team: https://rishi1999.github.io/random-projections/

Salisbury University, Salisbury, MD — Undergraduate Student Research
January 2020 - May 2020

- Worked with Dr. Joseph Anderson along with two other undergraduate students to conduct computer science research in randomized monte carlo methods.

WORK EXPERIENCE

Rutgers Mathematics Department, New Brunswick, NJ — Teaching Assistant
August 2021 - Present

- Hosted weekly office hours for students to ask questions.
- Held sessions where students came to practice problems, review, and ask questions.
- Graded weekly assignments, quizzes, and half of examinations.
- Proctored examinations.

Simons Foundation, New York, New York, "Workshop on Lean" — Lean Tutor
June 16–27, 2025

- Assisted lecturers in helping students solve mathematical problems in Lean.

Rutgers Mathematics Department, New Brunswick, NJ — Summer Instructor
May 2023 - July 2023; May 2024 - July 2024

- Delivered three lectures per week in Linear Algebra.
- Hosted weekly office hours for students.
- Created homework and exam solutions.
- Graded examinations and weekly quizzes.
- Proctored examinations.

Center for Student Achievement, Salisbury, MD — Supplemental Instruction Leader
January 2020 - May 2021

- Directly assisted students in developing study skills.
- Held sessions where students came to study, review material, and ask questions.
- Held two office hours a week.
- Attended the weekly discrete mathematics lectures.
- (Note: An SI leader has roles similar to those of an undergraduate TA.)