ZACK DOOLEY

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EDUCATION

Ph.D., Mathematics, The University of Western Ontario, London, ON — Expected August 2028

M.Sc., Mathematics, The University of Western Ontario, London, ON — August 2024

B.A., Mathematics, Reed College, Portland, OR — May 2023
Minor in Computer Science

HONORS

President's Honors for Academic Excellence, Reed College, 2019-2023
Opportunity Grant, Reed College, 2022

RESEARCH

Ph. D. Thesis Research
Semantics of Type Theories — September 2023 - Present

- Attempting to construct a more computable way of turning type theories into quasicategories

Polymath Jr. Online REU
Commutative Algebra — June 2022 - Sept. 2022

- Team member in an exploratory project learning commutative algebra, led by Prof. Ananthnarayan Hariharan of IIT Bombay
- Under guidance of our mentor, individually "rediscovered" properties of polynomial rings, local rings, and modules
- Continued research as part of a reading project into the fall 2022 semester

Knotted Surfaces in Dimension 4 — June - Aug. 2021

- Team member classifying properties of unknotted surfaces in dimension 4, led by Prof. Alex Zupan of University of Nebraska-Lincoln
- Classified invariants for unknotted surfaces focusing on tri-plane crossing number using combinatorial methods and programmatic searching
- Helped write results up into a presentation to be given at Joint Mathematics Meetings 2023

FORMALIZATION

Injective Types — September 2023 - December 2023

- Formalized portions of Martin Escardo's work on injective types for the Coq-HoTT library
- PR: https://github.com/HoTT/Coq-HoTT/pull/2153

WORK EXPERIENCE

University of Western Ontario, Graduate Teaching Assistant — Sept. 2023 - Present

- Graded, run tutorials, held office hours, etc. for a number of undergraduate courses including Linear Algebra, Intro to Proofs, and Group Theory

Reed College, Tutor Sept. 2021 - May 2023

- Provided Drop-In assistance for any math students looking for help on homework assignments

Reed College, Grader Sept. 2020 - Dec. 2022

- Graded homework for multiple sections of Intro to Analysis, Discrete Structures, and Real Analysis Classes

PAPERS

Tri-Plane Diagrams for Simple Surfaces in S^4
Allred, Wolfgang, Aragón, Manuel, Dooley, Zack, Goldman, Alexander, Lei, Yucong, Martinez, Isaiah, Meyer, Nicholas, Peters, Devon, Warrander, Scott, Wright, Ana, and Zupan, Alexander. "Tri-plane diagrams for simple surfaces in S^4." *Journal of Knot Theory and Its Ramifications*, vol. 32, no. 06, 2023, https://doi.org/10.1142/s0218216523500414.

PRESENTATIONS

University of Western Ontario Graduate Student Seminar Dooley, Z. (2024). *An Introduction to Proof Assistants* [University session]. University of Western Ontario Graduate Student Seminar, London, On.

- Introduced the basic ideas/purpose of proof assistant software, and showed live proof examples in Coq
- Gave a 50 min multi-media presentation to fellow graduate students including live proof demonstrations and answering questions

Senior Thesis Orals May 2023

- Presented and defended my senior thesis work on categorification
- Approximately 90 min oral exam presided over by a panel of 4 professors

Reed Math Student Colloquium
Dooley, Z. (2023). *A Categorical Introduction to Sheaf Theory* [University session]. Reed College Student Colloquium, Portland, OR.

- Presented basics of sheaf theory and category theory, topics related to research done as a part of my undergraduate thesis
- Gave a 45 min LaTeX presentation including questions taken from the audience

Joint Mathematical Meetings Polymath Presentations
Dooley, Z. et al. (2023). *Tri-Plane Diagrams for Simple Surface Knots* [Conference session]. Joint Mathematical Meetings, Boston, Massachustts.

- Presented research I participated in in the Polymath Online REU along with other students involved in research project at JMM 2023 to mathematicians from around the world
- Giving a summary of results from project in 20 min LaTeX presentation ($\sim$5 min per presenter) with time for questions

Reed Math Student Colloquium
Dooley, Z. (2021). *Knotted Surfaces in Dimension 4* [University session]. Reed College Summer Research Colloquium, Portland, OR.

- Presented on research I participated in in the Polymath Online REU to math students and faculty
- Gave a summary of our results and important proofs with a 10 min LaTeX presentation
- Responded to questions on my research