Madeleine E. Goertz

Curriculum Vitae

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Education

University of California, Berkeley, CA — Matriculating Aug. 2025
Ph.D. in Mathematics

California Polytechnic State University, San Luis Obispo, CA — Sept. 2021 – June 2025
M.S. in Mathematics — *GPA: 4.0/4.0*
Advised by Patrick Orson, wrote master's thesis *On Diffeomorphism Groups of Surfaces*
B.S. in Mathematics — *GPA: 4.0/4.0*
Advised by Eric Brussel, wrote senior project *On Moduli Spaces of Triangles*

Preprints & Publications

Journal Articles

1. The Torus of Triangles. (with E. Brussel). (to appear in *Involve, A Journal of Mathematics*). arXiv:2303.11446.

Conference Proceedings

1. Exhaustive Generation of Pattern-Avoiding s-Words. (with S. Buick, A. Lastmann, K. Pal, H. Qian, S. Tacheny, A. Williams, L. Williams, and Y. Zhai). (to appear in *Proceedings of the 23rd International Conference on Permutation Patters, 2025*). Link to Research Gate Preprint.

Preprints

2. The Quaternary Gray Code and How It Can Be Used to Solve Ziggurat and Other Ziggu Puzzles. (with A. Williams). arXiv:2411.19291. (preprint).
1. The Stack of Triangles Up to Similarity. (with E. Brussel, E. Guptill, & K. Lyle). arXiv:2408.07792. (preprint).

Selected Awards & Scholarships

Chancellor's Fellowship, UC Berkeley ..... Spring 2026
Academic Excellence Award, Cal Poly Bailey College of Science and Math ..... May 2025
Academic Excellence Award, Cal Poly Math Department ..... May 2025
Charles J. Hanks Excellence in Mathematics Scholarship, Cal Poly Math Department ..... May 2024
Frost Research Scholarship, Cal Poly Bailey College ..... Sept. 2022 – June 2025
First place, Physical & Mathematical Sciences, 37th Annual CSU Student Research Competition ..... Apr. 2023
Frost Summer Undergraduate Research Scholarship, Cal Poly Bailey College ..... June 2022 & June 2023

Research Program Participation

NSF SMALL REU, *Williams College* ..... Summer 2024
Advised by Aaron Williams, on *Combinatorial Algorithms & Hamilton Paths*
Frost Summer Undergraduate Research Program, *Cal Poly* ..... Summer 2023
Advised by Eric Brussel, on *Moduli Space of Triangles*
Frost Summer Undergraduate Research Program, *Cal Poly* ..... Summer 2022
Advised by Eric Brussel, on *Poncelet's Theorem*

Selected Research Communication

Talks for Mathematical Audiences

4. "Solving Ziggu Puzzles Using the Quaternary Gray Code." (with A. Williams). CM16 - Greedy Constructions of Gray Codes, *CanaDAM 2025: Canadian Discrete and Algorithmic Mathematics Conference*, Ottawa, CA, May 2025. (virtual talk).
3. "Moduli Space of Triangles & Euclid's Similarity Theorems." (with E. Brussel, E. Guptill, & K. Lyle). AMS Contributed Paper Session on Geometry, *Joint Mathematics Meetings*, San Francisco, CA. Jan. 2024.

2. "Geometry of the moduli spaces of similarity classes of triangles defined by three classical theorems." (with E. Brussel, E. Guptill, & K. Lyle). *2nd CSU Mathematical Sciences Conference*, Bakersfield, CA. Nov. 2023.
1. "Poncelet Families & The Torus of Triangles." (with E. Brussel). *1st CSU Mathematical Sciences Conference*, Northridge, CA. Nov. 2022.

Talks for General Audiences

3. "Solving Ziggu Puzzles Using the Quaternary Gray Code." (with A. Williams). *Cal Poly Bailey College of Science and Mathematics Student Research Conference*, San Luis Obispo, CA. May 2025.
2. "A Moduli Space of Triangles." (with E. Brussel). *4th Annual CSU Grad Slam*, Virtual Meeting. May 2024.
1. "The Torus of Triangles." (with E. Brussel). *37th Annual CSU Student Research Competition*, San Diego, CA. Apr. 2023.

Poster Presentations

2. "Three Moduli Spaces of Triangles." (with E. Brussel, E. Guptill, & K. Lyle). *Bailey College of Science and Mathematics 2024 Student Research Conference*, San Luis Obispo, CA. May 2024.
1. "Poncelet Families & The Torus of Triangles." (with E. Brussel). *Mathematics Department Summer Research Poster Symposium*, San Luis Obispo, CA. Oct. 2022.

Teaching Experience

Teaching experience as a graduate teaching associate and instructor of record.

Math 221: Calculus for Business and Economics, *Cal Poly* . . . . . Spring Quarter 2025
Math 118: Precalculus Algebra, *Cal Poly* . . . . . Fall Quarter 2024, Winter Quarter 2025

Other Work Experience

Mathematics Tutor, *Cal Poly Learning Support Center* . . . . . Oct. 2023 – June 2024
Grader, *Cal Poly Department of Mathematics* . . . . . Jan. 2023 – June 2023
Learning Assistant, *Cal Poly Department of Physics* . . . . . Apr. 2022 – June 2022
Coding Camp Instructor, *Coding with Kids LLC* . . . . . June 2019 – Sept. 2021