Madeleine E. Goertz

Curriculum Vitae

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Education

California Polytechnic State University, San Luis Obispo, CA — Sept. 2021 – June 2025
Master of Science in Mathematics — *GPA: 4.0/4.0*
Advised by Patrick Orson, wrote Master's Thesis *On Diffeomorphism Groups of Surfaces*
Bachelor of Science 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

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

Leadership & Involvement

Member, *Simple Group Seminar* . . . . . Sept. 2021 – June 2025
Member, *Cal Poly Association for Women in Mathematics Chapter* . . . . . Sept. 2021 – June 2025
Member, *Cal Poly Math Club* . . . . . Sept. 2021 – June 2025
Ambassador, *Cal Poly University Honors Program* . . . . . Feb. 2023 – June 2024
Member, *Cal Poly National and International Fellowships & Scholarships Advisory Board* . . . . . Feb. 2025 – June 2025

Skills

Technical: Mathematica, Java, Python, R, Git.
Nontechnical: English, German, Mathematics Communication.