## What is a Reedie 2020 Meet math major Maxine Elena Calle '20



Photo by Clayton Cotterell

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Major: Mathematics

Hometown: San Diego, California

Thesis adviser: Prof. Kyle Ormsby

Thesis: Morse Theory and Flow Categories

What it's about: Morse theory seeks to understand ambient spaces by studying the differentiable functions on them. Imagine flooding a landscape with water, and watching the flow of that water over the surface. We can record that information and use various mathematical tools to understand when spaces are topologically "the same" even if they look different to the naked eye. One method of storing this sort of information is called the flow category, and my thesis focuses on a particular result that relates the flow category of a Morse function to the original underlying space. **What it's** *really* **about:** How can we think of two spaces as "the same" when we have no fixed notion of shape?

**In high school:** I wore a lot of eyeliner and dyed my hair all the time, but was a goodie-two-shoes that didn't like breaking the rules. I played bass and sang in a self-identified jazz-punk band, but felt shy and awkward most of the time.

**Influential professors:** The professors in the math department have taught me to think of mathematics as a language, as a story that we tell each other. Professor Irena Swanson's Introduction to Analysis class showed me a way of doing mathematics that was unlike anything I had ever seen before, and she was the first professor who encouraged me to be a math major. Professor Jerry Shurman's Vector Calculus course helped me embrace mathematical learning and problem-solving as a collaborative activity.

Outside of math, one of the most impactful classes that I took was Senior Symposium. My section was comprised of about 14 seniors and was hosted by Profs. Lena Lencek, Dustin Simpson, and William Diebold. This class was particularly challenging for me because, in addition to the deeply emotional and vulnerable nature of the works we engaged with, it was not at all in my comfort zone. Having spent the last few years learning about things like complex integration and infinite series, I felt that I lacked the know-how to talk about delicate things like race and racism in America, the struggles of displaced people, or environmental justice. I believe that it's just as important for scientists and STEM majors to engage critically with the world and have the difficult conversations that don't get included in our classes.

Influential book: Category Theory in Context by Emily Riehl.

**Concept that blew my mind:** There are always two antipodal points on the Earth's equator with the same temperature.

**Cool stuff:** I've been involved with a lot of community efforts in the Mathematics Department, such as tutoring in the Math Help Center, presenting in the student colloquium, and co-organizing STEMGeMs (Reed's student group for gender minorities in STEM). I also went on a backpacking trip to Mount Adams, worked in the library archives at Reed and at the Portland Art Museum, helped make costumes for the Theater Department, led the aerial acrobatics troupe at Reed, and taught in a circus studio off-campus.

**Awards:** Outstanding poster award for original mathematical research presentation, commendation for academic excellence all four years at Reed, and a NSF Graduate Research Fellowship.

**Challenge I faced:** I struggled (and still struggle) with my confidence. As a field, mathematics has a reputation for celebrating the "lone genius" who is stereotypically a white, cisgender man. I am fiercely committed to the idea that mathematics, despite its abstract nature, should be accessible to more than the "initiated few." The well-documented systemic hindrances that people from disadvantaged communities face is often not the result of overt discouragement, but rather a lack of active support and empowerment, due in

part to mass underrepresentation. It is easy to feel like you are the only one who is stupid and doesn't get it. The truth of it is, math is hard and there's more than one way to be good at it. The benefit of struggling is that you learn what to do when you're stuck, you learn how to be patient with yourself, and you learn to have compassion for others who are struggling too.

**How Reed changed me:** As cliché as this may sound, I have learned just as much from my peers at Reed as from my classes. It's been so lovely to be around people who are just as interested in learning as I am, both in and out of the classroom. I've had the chance to learn from so many interesting people, from so many different backgrounds, and they have inspired me to think more critically about my identity and my role in this complex and rapidly changing world. My time at Reed has also inspired me to try to live with radical kindness. Reed can feel cold and isolating at times, so it's been really important to me to find ways to create kind-hearted and welcoming spaces.

**Financial aid:** Like many Reedies, I would not be able to attend Reed without help from the generous scholarships I have received, including the Alvin and Alveda Pearson Scholarship and the James B. Small Scholarship. Denise VanLeuven and the music department provided a scholarship for my piano lessons at Reed, which allowed me to continue to grow as a musician and as a more well-rounded creative member of the community.

What's next: I'll be starting a PhD program at the University of Pennsylvania in the fall.