

# Samuel Perales

Department of Mathematics  
The University of Texas at Austin

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github: [github.com/CapSnCrunch](https://github.com/CapSnCrunch)

## Education

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The University of Texas at Austin

Fall 2018 - Present

*B.S. in Mathematics*

Expected 2022

GPA: 3.6

*Coursework:* Functional Analysis, Complex Analysis, PDEs., Mathematical Modeling, Stochastic Processes, Numerical Methods,  
Differential Geometry, Topology, Algebraic Structures, Applied Statistics, Quantum Information Science, Software Design

Austin Community College

Spring 2017 - Spring 2018

*Dual Enrollment through Hendrickson High School*

GPA: 4.0

*Coursework:* Linear Algebra, Differential Equations, Multivariable Calculus

## Research

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Texas Experimental Geometry Lab

Spring 2021 - Present

Computational approaches to problems in geometric group theory.

[Personal Article](#) | [Group Website](#)

REU: Life Sciences, Arizona State University

Summer 2021

Agent-based modeling of in-nest social insect dynamics. Continuing related research through the Fall semester.

[Personal Article](#) | [Technical Report](#)

REU: Computational Imaging, Harvey Mudd College

Summer 2020

Implemented fourier ptychographic microscopy techniques to create a 3D-printed microscope.

[Personal Article](#) | [Technical Report](#)

## Presentations

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|--|---------------|
| 1) 'Can you hear the shape of a drum?'<br>Directed Reading Program Virtual Symposium - UT Austin   | December 2021 |
| 2) 'In-nest information flow analysis of social ant colonies'<br>SACNAS National Diversity in STEM (NDiSTEM) Digital Conference                    | October 2021  |
| 3) 'Proof of Uniqueness for Gross-Pitaevskii Hierarchy via Board Games'<br>Undergraduate Research Forum - UT Austin                                | May 2021      |
| 4) 'Spectral Theorem for Bounded Self-Adjoint Operators with Projection-Valued Measures'<br>Directed Reading Program Virtual Symposium - UT Austin | December 2020 |
| 5) 'An Exploration of the Dynamics of Elliptic Curves'<br>Undergraduate Research Forum - UT Austin   | May 2019      |

## Work Experience

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Peer Tutor, The University of Texas at Austin

Spring 2019 - Spring 2021

Undergraduate Assistant, The University of Texas at Austin

Fall 2020 - Spring 2021

Helped run the Sanger Learning Center by training incoming tutors, responding to emails, and organizing events.

## Activities

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Directed Reading Program: Numerical Methods

Fall 2021

Finite element methods for estimating the spectrum of the laplacian on an arbitrary boundary.

Research Training Grant: Analysis

Spring 2021

Mathematical physics literature review of '*On the Uniqueness of Solutions to the Gross-Pitaevskii Hierarchy*'. Presented a poster at an undergraduate research forum.

Directed Reading Program: Spectral Theory

Fall 2020

Reading about the Spectral Theorem for bounded self-adjoint operators with projection-valued measures.

Freshman Research Initiative: Symmetry

Spring 2019

Research stream designed to introduce math undergraduates to the research process including reading articles and creating / presenting a poster at an undergraduate research forum.

## Memberships

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Math Club

*Vice President*

Spring 2020 - Present

Weekly math lectures and socials. I ran reading groups on graph theory and topics in computational mathematics.

Association for Women in Math

Fall 2020 - Present

Weekly meetings with advice for undergrads. Occasional lectures from female and non-binary professors.

Sunday Morning Math Group

*Volunteer*

Spring 2019 - Spring 2020

Worked with Austin middle and high schoolers biweekly on introductory undergraduate math topics.

## Technical Skills

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Software Development

Python (numpy, scipy, pandas, pickle, matplotlib, pytorch), MATLAB, R, Processing, Version Control, XCode, Swift, Firebase

Web Development

HTML, CSS, JavaScript, SQL, React, Bootstrap, p5.js