

# ALEC S. ZABEL-MENA

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azabelmena.github.io

## EDUCATION

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BS	Pure Mathematics, Minor in Cybersecurity University of Puerto Rico, Río Piedras	August 2016 - June 2022
MS	Pure Mathematics University of Puerto Rico, Río Piedras	August 2022 - Present In Progress

## PUBLICATIONS

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### Works in Preparation

Janwa, H. Zabel-Mena, A. *An Efficient Implementation and Analysis of Zeta Functions of APN Curves and Their Protograph LDPC Codes for Space Applications.* unpublished.

## PRESENTATIONS AND TALKS

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- Zabel-Mena, Alec S., Janwa Heeralal, Agrinoni, Carlos, (2024, March). An Efficient Implementation and Analysis Of Zeta Functions Of APN Curves and Their Protograph LDPC Codes [contributed talk]. 39<sup>th</sup> Seminario Interuniversitario de Investigación en Ciencias Matemáticas (SIDIM), Humacao, PR.

## GRANTS AND AWARDS

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**NASA PR Space Grant Fellowships and Scholarship Program (No. 80NSSC20M0052)**  
University of Puerto Rico August 2024 - May 2025

**NASA PR Research Assistantship (No. 80NSSC20M0052)**  
University of Puerto Rico January 2024 - May 2024

**NASA PR Research Assistantship (No. 80NSSC20M0052)**  
University of Puerto Rico August 2023 - December 2023

**Puerto Rico Louis Stokes Alliance for Minority Participation**  
University of Puerto Rico August 2021 - May 2022

## RESEARCH

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**An Efficient Implementation and Analysis of Zeta Functions of APN Curves and Their Protograph LDPC Codes for Space Applications**  
University of Puerto Rico August 2021 - Present

- Researching APN functions and the classification of certain 2-error correcting cyclic codes for use in cryptography and coding theory.
- Mentored by Professor Heeralal Janwa, Ph.D.

**The General Linear Group: Finding  $2 \times 2$  Representations of Finite Groups**  
University of Puerto Rico April 2020

- Final project for the second undergraduate seminar in mathematics (MATE3170). Research the general linear group on  $2 \times 2$  matrices and representations of well known groups using these matrices.
- Worked under the supervision of Professor Raúl Figueroa, Ph.D.

### **Matroid Theory**

University of Puerto Rico

November 2019

- Final project for the first undergraduate seminar in mathematics (MATE3070). Gave a survey of the field of Matroid theory, and its applications in Graph theory, Topology, and Algorithm Design.
- Worked under the supervision of Professor Iván Cardona, Ph.D.

### **Algebraic Codes over Elliptic and Hermitian Curves**

University of Puerto Rico

May 2019

- Research paper, and final project of the Introduction to Coding Theory course. Studied and found algebraic geometric codes using elliptic and Hermitian curves for use in coding theory and cryptography.
- Worked under the supervision of Professor Heeralal Janwa, Ph.D.

## **RESEARCH INTERESTS**

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|---|--|
| • Commutative Algebra                             | • Algorithm Design for use in computer science and computational mathematics             |
| • Algebraic Geometry                              |  |
| • Finite Fields                                   | • High Performance Computing   |
| • Graph theory, Matroid theory, and Combinatorics | • Cybersecurity research and normalizing a culture that is privacy and security oriented |
| • Category Theory and Homotopy Type Theory        | • Post-Quantum error correction  |

## **TEACHING AND MENTORING**

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### **Proyecto Tutorías DECEP**

2020-2021

University of Puerto Rico, Río Piedras  
Mathematics tutor

- Conducted assessments to identify the educational needs of my students and developed individualized learning plans.
- Tasked with providing tutoring services to seven high school students for 10 hours a week in the subjects of Algebra and Pre-Calculus.

### **Self-Employed**

2019-2021

Mathematics tutor

- Evaluated students learning styles and provided appropriate techniques for maximizing understanding and minimizing frustration.
- Simplified math concepts while coaching students to think critically when problem solving; eventually introducing them to axiomatic systems within mathematics.
- Provided tutoring one-on-one to five highschool students in the subjects of Algebra, Pre-Calculus, and Geometry for two times a week, at two hours for each session.

## **HONORS AND AWARDS**

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**MEMBERSHIPS AND AFFILIATIONS**

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Consejo de General De Estudiantes (UPRRP) August 2024 – Present  
Representante ante el Consejo de Estudios Graduados e Investigación

Consejo de Estudiantes de Ciencias Naturales August 2023 – Present  
Representante ante el Decanato de Estudios Graduados e Investigación

Asociación de Estudiantes de Ciencias de Computos (AECC) 2022 - Present

Asociación Estudiantil de Matemáticas (AeMAT) 2019-Present

Treasurer August 2022 – May 2024

Lembrança Negra Capoeira (Puerto Rico) 2016 - 2018  
Corda Crua-Verde

Senzala Capoeira (Puerto Rico) 2018 - Present  
Corda Crua-Laranja

CEO of HTMX 2023 – Present

**SKILLS**

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- **Languages**

- English
- Spanish
- Portuguese

- **Software**

- Excel
- $\text{\LaTeX}$
- Knowledge of UNIX-like systems and the commandline to streamline workflow and automate repetitive tasks
- Privacy and Security Oriented
- C programming
- `nix`