

# ALEC S. ZABEL-MENA

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## EDUCATION

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<b>BS</b>	Pure Mathematics Minor in Cybersecurity University of Puerto Rico, Río Piedras	August 2016 - Present
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## RESEARCH EXPERIENCE

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<b>Puerto Rico Louis Stokes Alliance for Minority Participation</b> University of Puerto Rico	August 2021 - Present
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- 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.

## RESEARCH WORK

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<b>The General Linear Group: Finding <math>2 \times 2</math> Representations of Finite Groups</b> University of Puerto Rico	April, 2020
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- 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.

<b>Matroid Theory</b> University of Puerto Rico	November, 2019
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- 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.

<b>Algebraic Codes over Elliptic and Hermitian Curves</b> University of Puerto Rico	May, 2019
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- 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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| <ul style="list-style-type: none"><li>• Group Theory</li><li>• Finite Fields</li><li>• Algebraic Geometry and the study of algebraic curves</li><li>• Topology and its use in other areas of mathematics</li></ul> | <ul style="list-style-type: none"><li>• Graph theory, Matroid theory, and Combinatorics</li><li>• Algorithm Design for use in computer science and computational mathematics</li><li>• Cybersecurity research and normalizing a culture that is privacy and security oriented</li></ul> |
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- Post-Quantum error correcting codes
- Post-Quantum implementations of cryptographic algorithms

## TEACHING AND MENTORING EXPERIENCE

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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.

## PUBLICATIONS.

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### Works in Preperation

Janwa, H. Zabel-Mena A. *APN Functions, and Classifying 2-Error-Correcting Cyclic Codes.* unpublished.

## HONORS AND AWARDS

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Dean's List

2016 - 2021

## MEMBERSHIPS AND AFFILIATIONS

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Asociación de Estudiantes de Matemáticas (AeMAT)  
Senzala Capoeira

2019-Present  
2016 - 2019

## PROFESSIONAL DEVELOPMENT

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### Webinars

- Going Down the Cyber Security Rabbit Hole February 2022

### Conferences attended as spectator

- Interuniversity Seminar on Mathematical Sciences Research (SIDIM) February 2022

## SKILLS

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### • Languages

- English: Native
- Spanish: Native

- Portuguese: Basic (A2)

- **Software**

- Excel
- L<sup>A</sup>T<sub>E</sub>X
- Knowledge of UNIX-like systems and the commandline to streamline workflow and automate repetitive tasks.
- Privacy and Security Oriented
- C/C++
  - Used C++ to implement a polynomial root finding algorithm in order to find the number of points on a given rational surface.
- SAGE
  - Used SAGE to find elliptic curves that attained the Hasse-Weil bound.