

# ALEC S. ZABEL-MENA

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## EDUCATION

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BS      Pure Mathematics, Minor in Cybersecurity      August 2016 - Present  
University of Puerto Rico, Río Piedras

## RESEARCH EXPERIENCE

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APN Functions, and Classifying 2-Error-Correcting Cyclic Codes  
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.

## GRANTS AND AWARDS

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

NASA PR Space Grant Fellowships and Scholarship Program (No. 80NSSC20M0052)  
University of Puerto Rico      August 2022 - Present

## 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><li>• Graph theory, Matroid theory, and</li></ul> | <ul style="list-style-type: none"><li>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><li>• Post-Quantum error correcting codes</li></ul> |
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## TEACHING AND MENTORING EXPERIENCE

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Proyecto Tutorías DECEP University of Puerto Rico, Río Piedras Mathematics tutor	2020-2021
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- 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 Mathematics tutor	2019-2021
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- 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 Preparation

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
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## MEMBERSHIPS AND AFFILIATIONS

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Asociación de Estudiantes de Ciencias de Computos (AECC)	2022 - Present
Asociación de Estudiantes de Matemáticas (AeMAT)	2019-2020
Senzala Capoeira	2016 - 2020

## PROFESSIONAL DEVELOPMENT

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Conferences Given

- Junior Technical Meeting (JTM)

June 2022 Webinars

- Going Down the Cyber Security Rabbit Hole  
Dr. José Ortiz Ubarri, University of Puerto Rico

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
- $\text{\LaTeX}$
- 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.