

## Contact Information

Mathematical Sciences Building, Office 609  
Department of Mathematics, Purdue University

 epabonca@purdue.edu  
 ejpaboncancel.github.io

## Research Interests

Dynamical Systems (e.g. Mathematical Physics, Modeling in Material Science), Machine Learning (e.g. Physics-Informed Neural Networks), Computational & Applied Mathematics (e.g. Numerical Methods, Data Assimilation).

## Education & Academic Background

### Doctor of Philosophy in Mathematics

Purdue University, West Lafayette, Indiana | Advisor: Prof. Aaron Yip

May 2029

### Master of Science in Mathematics

Purdue University, West Lafayette, Indiana | Advisor: Prof. Aaron Yip

May 2026

### Bachelor of Science in Pure Mathematics (*Magna Cum Laude*)

December 2022

### Curricular Sequence in Applied Mathematics for Science and Engineering

University of Puerto Rico, Mayagüez Campus (UPRM), Mayagüez, Puerto Rico | Advisor: Prof. Reyes M. Ortiz Albino

## Skills and Other Information

Programming & Computation: Python, Julia, C++, SageMath, MATLAB | Formatting & Tools: HTML, L<sup>A</sup>T<sub>E</sub>X, Git

Math & AI/ML: NumPy, SciPy, PyTorch, TensorFlow, JAX, Flux, CUDA | Spoken Languages: English and Spanish

## Research Experience

### Research Intern in Dynamical Systems and Machine Learning

May 2025–August 2025

Livermore, California

URA-Sandia Graduate Student Summer Fellowship

Computational & Information Sciences Foundation, Sandia National Laboratories

Supervised by: Dr. Moe Khalil, Sandia National Laboratories

### Research Intern in Machine Learning

May 2023–August 2023

Lexington, Massachusetts

MIT Lincoln Laboratory Summer Research Program (GEM Fellowship Employer Sponsor)

Group 39, Division 3, MIT Lincoln Laboratory, Massachusetts Institute of Technology

Supervised by: Dr. Sam Polk & Dr. Mabel Ramírez, MIT Lincoln Laboratory

### Research Assistant in Number Theory

August 2019–December 2022

Mayagüez, Puerto Rico

Puerto Rico Louis Stokes Alliance for Minority Participation

Department of Mathematical Sciences, University of Puerto Rico, Mayagüez Campus

Supervised by: Prof. Reyes M. Ortiz Albino, University of Puerto Rico at Mayagüez

### Research Assistant in Combinatorics

June 2022–August 2022

Providence, Rhode Island

Summer@ICERM 2022: Computational Combinatorics

Institute for Computational and Experimental Research in Mathematics, Brown University

Supervised by: Prof. Pamela E. Harris, University of Wisconsin-Milwaukee

### Research Assistant in Algebraic Coding Theory

June 2021–August 2021

Johnson City, Tennessee

NSF REU in Combinatorics, Probability and Algebraic Coding Theory

East Tennessee State University & University of Puerto Rico at Ponce

Supervised by: Prof. Fernando Piñero González, University of Puerto Rico at Ponce

## Projects

### Project in Numerical Partial Differential Equations

January 2026–May 2026

MA61500: Numerical Methods for Partial Differential Equations

Instructor: Prof. Di Qi, Purdue University

TBA

### Project in Numerical Differential Equations

August 2025–December 2025

MA57300: Numerical Solutions of Ordinary Differential Equations

Instructor: Prof. Di Qi, Purdue University

*Data Assimilation for the Lorenz 96 Model*

## Projects in Optimal Transport and Neural Networks

January 2025–May 2025

Purdue University, West Lafayette

MA59500MM: Computational Optimal Transport and Deep Generative Models

Instructor: Prof. Rongjie Lai, Purdue University

*Normalizing Flows Optimal Transport implementation on MNIST Dataset*

*WGAN and Monge Map implementation on MNIST Dataset*

## Project in Neural Networks and Dynamical Systems

November 2024–December 2024

Purdue University, West Lafayette

MA59500MM: Introduction to Mathematical Modeling

Instructor: Prof. Alexandria Volkening, Purdue University

*Physics-Informed Neural Networks (PINNs) for Hurricane Trajectory Prediction*

## Project in Biotechnology

June 2023–July 2023

MIT Lincoln Laboratory Summer Research Program

2023 MIT Lincoln Laboratory Intern Innovative Idea Challenge (I<sup>3</sup>C) (3rd Place Project Winner)

Supervised by: Ryan Burrow and Ashok Kumar, MIT Lincoln Laboratory

*SKINS: Skin-growth boosting and Intra-absorptive Solution bandages*

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## Awards and Merits

### Fellowships, Scholarships and Prizes

2025 Universities Research Association-Sandia National Labs Graduate Summer Fellowship

May 2025–August 2025

2023 National GEM Consortium PhD Science Fellowship

August 2023–May 2024

- Purdue University Department of Mathematics Sponsorship
- MIT Lincoln Laboratory Employer Sponsorship (Internship)

August 2023–May 2024

May 2023–August 2023

2023 MIT Lincoln Laboratory I<sup>3</sup>C 3<sup>rd</sup> Place Research Proposal Prize

July 2023

2022 Evertec Inc. STEM Scholarship

October 2022

Puerto Rico-Louis Stokes Alliance for Minority Participation Research Scholarship

August 2019–December 2022

### Merits and Honors

2023 Ford Foundation Predoctoral Fellowship Honorable Mention

March 2023

2022 Hispanic Scholarship Fund Scholar

June 2022

National Math Alliance Predoctoral Scholar

November 2021

UPRM Faculty of Arts and Sciences Honor Roll

August 2018–May 2023

National Trig-Star Math Competition, 16th Overall Finalist

June 2017

Eagle Scout Rank, with 2 Silver Palms

May 2017

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## Papers and Articles

The asterisk symbol (\*) denotes alphabetical order authorship.

### Research Articles and Preprints:

- [1] S. Polk, E.J. Pabon-Cancel, R. Paleja, K. Chestnut-Chang, R. Jensen and M. Ramirez.  
Unsupervised Behavior Inference from Human Action Sequences (UNBIAS).  
*2024 IEEE Conference on Games (CoG), Milan, Italy, 2024, pp. 1-8.*
- [2] \*A. Allen, E.J. Pabon-Cancel, F. Piñero-Gonzalez and L. Polanco.  
Improving the Dimension Bound of Hermitian-Lifted Codes.  
arXiv: <https://arxiv.org/abs/2302.01557>
- [3] \*D. Chen, P.E. Harris, J. Carlos Martinez Mori, E.J. Pabon-Cancel and G. Sargent.  
Permutation Invariant Parking Assortments.  
*Enumerative Combinatorics and Applications*, **4:1**, 1-25 (2024). #S2R4.
- [4] \*I. Byrne, N. Dodson, R. Lynch, E.J. Pabon-Cancel and F. Piñero-Gonzalez.  
Improving the minimum distance bound of Trace Goppa codes.  
*Designs, Codes and Cryptography*. **91**, 2649–2663 (2023).

### Contributions to the profession:

- [1] \*P.E. Harris, Z. Markman, L. Martinez, A. Mock, E.J. Pabón-Cancel, A. Verga, and S. Wang.  
A Model for a One-Hour Workshop on Mentoring.  
*MAA Focus*, **43**(1), 18-21 (2023).

## ***Teaching and Grading Experience***

- MA 59500MB: Mathematical Biology (Grading) January 2026–May 2026
  - MA 32500: History of Mathematics (Grading) January 2026–May 2026
  - MA 26100 REC: Multivariate Calculus Recitation (Teaching) August 2025–December 2025  
January 2025–May 2025
  - MA 13900: Mathematics for Elementary Teachers III (Grading) August 2024–December 2024
  - MA 13900: Mathematics for Elementary Teachers III (Grading) June 2024–August 2024

## ***Poster Sessions, Presentations and Conferences***

- Purdue University Prospective Student Visit Weekend Graduate Student Research Expo.  
*Mathematical Sciences Building, Purdue University*  
Poster: Data-Driven Closure Models (DDCMs)
  - Purdue University Student Computational and Applied Mathematics Seminar  
*Helen B. Schleman Hall, Purdue University*  
Presentation: Data-Driven Closure Models (DDCMs)
  - URA-Sandia Graduate Summer Fellowship Lightning Talk  
Presentation: Data-Driven Closure Models (DDCMs)
  - Sandia National Laboratories CA SIP Intern Symposium  
*Auditorium, Sandia National Laboratories-Livermore*  
Poster: Data-Driven Closure Models (DDCMs)
  - Combinatorics and Coding Theory in the Tropics (UPR-Ponce)  
*Invited REU Seminar: My Story & Permutation-Invariant Parking Assortments*
  - Purdue University Student Commutative Algebra Seminar  
*Helen B. Schleman Hall, Purdue University*  
Presentation: Results in  $\tau_{(n)}$ -factorizations and  $\tau_{(n)}$ -primes.
  - Purdue University Student Math History Seminar  
*Lawson Computer Science Building, Purdue University*  
Presentation: Testimonios: Stories of Latinos and Hispanics in Mathematics
  - Underrepresented Students in Topology and Algebra Research Symposium 2024  
*University of Iowa*
  - 2023 MIT Lincoln Lab Intern Innovative Idea Challenge  
*MIT Lincoln Laboratory Auditorium*  
Poster: Skin-Absorptive and Skin-Growth Boosting Bandages  
Presentation: SKINS: Skin-growth boosting and Intra-absorptive Solution Bandages
  - Combinatorics and Coding Theory in the Tropics (UPR-Ponce)  
*Invited REU Seminar Talk: Graduate School: Application tips and advice*
  - 2023 ACS Junior Technical Meeting-Puerto Rico Interdisciplinary Scientific Meeting  
*University of Puerto Rico at Bayamón, Sponsored by PR-LSAMP*  
Presentation: Properties of  $\tau_{(n)}$ -primes
  - 38th Interuniversity Mathematical Sciences Research Seminar  
*University of Puerto Rico, Mayagüez Campus*  
Presentation: Permutation Invariant Parking Assortments
  - 2023 AAAS Emerging Researchers National Conference in STEM  
*Omni Shoreham Hotel*  
Poster: Permutation Invariant Parking Functions with cars of assorted lengths

- Joint Mathematics Meetings 2023  
*John B. Hynes Veterans Memorial Convention Center*  
Poster: Permutation Invariant Parking Functions with cars of assorted lengths  
Presentation: Permutation Invariant Parking Functions with Cars of Arbitrary Lengths
- Field of Dreams Conference 2022  
*The Graduate Hotel, University of Minnesota-Twin Cities*
- 2022 SACNAS National Diversity in STEM Conference  
*Pedro Roselló Convention Center*  
Poster: The Study of  $\tau_{(n)}$ -primes
- 2022 Gulf Coast Undergraduate Research Symposium  
*William Marsh Rice University*  
Presentation: Properties of  $\tau_{(n)}$ -primes
- Summer@ICERM 2022: Computational Combinatorics  
*Institute for Computational and Experimental Research in Mathematics*  
Presentation: On Permutation-Invariant Parking Sequences
- 2022 ACS Junior Technical Meeting-Puerto Rico Interdisciplinary Scientific Meeting  
*University of Puerto Rico at Humacao*  
Presentation: The Study of  $\tau_{(n)}$ -primes
- Joint Mathematics Meetings 2022  
Poster: Improving Bounds of Hermitian-Lifted Codes
- 37th Interuniversity Mathematical Sciences Research Seminar  
Poster: The Study of  $\tau_{(n)}$ -primes  
Presentation: Improving Bounds of Hermitian-Lifted Codes
- 2021 Math REU Conference@Clemson University  
Presentation: Improved Hermitian-Lifted Codes
- 2021 ACS Junior Technical Meeting-Puerto Rico Interdisciplinary Scientific Meeting  
Presentation: The Study of  $\tau_{(n)}$ -atoms
- 35th Interuniversity Mathematical Sciences Research Seminar  
*University of Puerto Rico at Cayey*  
Poster: The Study of  $\tau_{(n)}$ -atoms

4-7 January 2023

Boston, Massachusetts

4-6 November 2022

Minneapolis, Minnesota

27-29 October 2022

San Juan, Puerto Rico

8-9 October 2022

Houston, Texas

3 August 2022

Providence, Rhode Island

9 April 2022

Humacao, Puerto Rico

6-9 April 2022

Virtual Conference

25-26 February 2022

Virtual Conference

19 July 2021

Virtual Conference

23-24 April 2021

Virtual Conference

6-7 March 2020

Cayey, Puerto Rico

## Academics and Coursework

### Purdue University

#### Qualifying Exams:

MA 55300: Introduction to Abstract Algebra – Passed August 2024

MA 54400: Real Analysis and Measure Theory – Passed January 2026

#### Coursework (Graduate):

MA 61500: Numerical Methods for Partial Differential Equations

January 2026–May 2026

MA 53200: Elements of Stochastic Processes

January 2026–May 2026

MA 59800ZAT: Hamiltonian Dynamics

January 2026–May 2026

MA 55400: Linear Algebra

August 2025–December 2025

MA 51900: Introduction to Probability

August 2025–December 2025

MA 57300: Numerical Solutions of Ordinary Differential Equations

August 2025–December 2025

MA 59500OT: Computational Optimal Transport and Deep Generative Models

January 2025–May 2025

MA 59800ZY: Topics in Dynamical Systems (Bifurcation Theory)

January 2025–May 2025

MA 54600: Introduction to Functional Analysis

January 2025–May 2025

MA 59500AFF: Analytic Theory of Function Fields

August 2024–December 2024

MA 59500MM: Introduction to Mathematical Modeling

August 2024–December 2024

MA 54300: Introduction to Ordinary Differential Equations and Dynamical Systems

January 2024–May 2024

MA 54400: Real Analysis and Measure Theory

January 2024–May 2024

MA 55300: Introduction to Abstract Algebra	August 2023–December 2023
MA 53000: Functions of a Complex Variable I	August 2023–December 2023
<b>University of Puerto Rico, Mayagüez Campus</b>	
<i>Coursework (Graduate):</i>	
MATE 6101: Number Theory I	August 2022–December 2022
MATE 5150: Linear Algebra	January 2021–May 2021
<i>Coursework (Undergraduate):</i>	
MATE 4000: Elements of Topology	August 2022–December 2022
MATE 4052: Advanced Calculus II	January 2022–May 2022
MATE 4051: Advanced Calculus I	August 2021–December 2021
MATE 4061: Numerical Analysis I	August 2021–December 2021
MATE 4021: Introduction to Mathematical Logic	August 2021–December 2021
MATE 4010: Introduction to Complex Variables	January 2021–May 2021
ESMA 4001: Mathematical Statistics I	January 2021–May 2021
MATE 4020: Partial Differential Equations and Fourier Series	August 2020–December 2020
MATE 4008: Introduction to Algebraic Structures	August 2020–December 2020
MATE 3040: Theory of Numbers	August 2020–December 2020
MATE 4009: Ordinary Differential Equations	June 2020–July 2020
MATE 4031: Introduction to Linear Algebra	January 2020–May 2020
COMP 3010: Introduction to Computer Programming I	January 2020–May 2020
MATE 3063: Calculus III	January 2020–May 2020
MATE 3032: Calculus II	August 2019–December 2019
MATE 3020: Introduction to Mathematical Foundations	August 2019–December 2019
MATE 3031: Calculus I	June 2019–July 2019
MATE 3172: Precalculus II	January 2019–May 2019
MATE 3171: Precalculus I	August 2018–December 2018

### ***Student Associations***

**PythagoRUM**

*Co-founder & Vice-President*

**Society of Physics Students, UPRM Chapter**

*Committee Assistant*

August 2022–December 2022

Mayagüez, Puerto Rico

August 2018–December 2022

Mayagüez, Puerto Rico