Daniel Flores

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Research Interests

My main areas of research are analytic number theory, harmonic analysis, applications of the Hardy-Littlewood circle method, and arithmetic statistics. Additionally, I am interested in learning more about sieve theory, additive combinatorics, and exponential sum bounds.

Education

- **PhD in Mathematics**, Purdue University   Fall 2019 - Present
  Advisor: Trevor Wooley

- **BS in Mathematics**, University of Houston   Fall 2016 - Spring 2019
  Advisor: Alan Haynes

- **AS**, Lone Star College-North Harris   Fall 2013 - Spring 2016

Publications

Journal Articles

(1) *A quantitative Hasse principle for weighted quartic forms*, Mathematika. 70 (2024), no. 1, Paper No. e12236, 24pp. https://doi.org/10.1112/mtk.12236

(2) *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Bulletin of the Australian Mathematical Society, pp. 1–8, 2025. doi:10.1017/S0004972724001345

Submitted

(3) *A circle method approach to K-multimagic squares*, 2024. https://arxiv.org/abs/2406.08161 (Submitted)

(4) (Joint with Kiseok Yeon) *The Hasse principle for homogeneous polynomials with random coefficients over thin sets II*, 2024. https://arxiv.org/abs/2506.01291

Awards & Fellowships

- **Purdue University**:

  - Ross-Lynn Research Scholar Grant   Fall 2024 - Spring 2025
  - Ross Fellowship   Fall 2019 - Spring 2023

- **University of Houston**:

  - Charles P. Benner Scholarship   Spring 2019

- Provost's Undergraduate Research Scholarship   Fall 2018 - Spring 2019
- Charles P. Benner Scholarship   Fall 2017

Teaching & Tutoring Experience

- **Purdue University**:

  - MA 16010 - Applied Calculus I Lecturer assignment   Fall 2025
  - MA 41600 - Probability Grader assignment   Summer 2025
  - MA 34100 - Foundations of Analysis Grader dual assignment   Fall 2023
  - MA 55300 - Introduction To Abstract Algebra Grader assignment   Fall 2022
  - MA 55700 - Abstract Algebra I Grader assignment   Fall 2022
  - MA 26100 - Multivariate Calculus TA assignment   Fall 2021
  - MA 26100 - Multivariate Calculus TA assignment   Fall 2020
  - MA 16600 - Analytic Geometry And Calculus II TA assignment   Fall 2019

- **University of Houston**:

  - MATH 4366 - Numerical Linear Algebra   Spring 2019
  - MATH 3331 - Ordinary Differential Equations   Fall 2018

- **Lone Star College**:
  Mathematics Tutor   Fall 2013 - Spring 2019
  Courses tutored:

  - College Algebra.
  - Precalculus.
  - Calculus I, II, III.
  - Ordinary Differential Equations.
  - Linear Algebra.

Invited Talks

1. *The Hasse principle for random homogeneous polynomials in thin sets*, AMS Central Sectional meeting, Washington University in St. Louis, Fall 2025.

2. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Analysis Seminar, Washington University in St. Louis, Spring 2025.

3. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Algebra Seminar, Rice University, Spring 2025.

4. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Number Theory Seminar, Kansas State University, Spring 2025.

5. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Purdue Analytic Number Theory and Harmonic Analysis, Purdue University, Spring 2025.

6. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Joint Mathematics Meeting: Math Alliance, Seattle Convention Center, Spring 2025.

7. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Number Theory Seminar, University of Göttingen, Fall 2024.

8. *A circle method approach to K-multimagic squares*, Number Theory Seminar, Stanford University, Fall 2024.

9. *A circle method approach to K-multimagic squares*, Number Theory Seminar, University of California in Davis, Fall 2024.

10. *A quantitative Hasse principle for weighted quartic forms*, AMS Central Sectional meeting, University of Wisconsin-Milwaukee, Spring 2024.

11. *A Gentle Introduction to the Circle Method*, Purdue Graduate Student Analysis Seminar, Purdue University, Fall 2023.

12. *Classification of noisy images with a coupled inversion-classification neural network.* LA-TX Undergraduate Mathematics Conference, LSU, Fall 2018.

Submitted Talks

1. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, 33èmes Journées Arithmétiques, University of Luxembourg, Spring 2025.

2. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Combinatorial and Additive Number Theory 2025, CUNY, Spring 2025.

3. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Integers Conference 2025, University of Georgia, Spring 2025.

4. *A circle method approach to K-multimagic squares*, Canadian Number Theory Association XVI, University of Toronto, Summer 2024.

5. *A circle method approach to K-multimagic squares*, Combinatorial and Additive Number Theory 2024, CUNY, Spring 2024.

6. *A quantitative Hasse principle for weighted quartic forms*, Southern Regional Number Theory Conference, LSU, Spring 2024.

7. *A quantitative Hasse principle for weighted quartic forms*, Pittsburgh Links among Analysis and Number Theory, University of Pittsburgh and Carnegie Mellon University, Spring 2024.

Attended Conferences

1. **Full circle**, Conference celebrating 100 years of the circle method, Institut Mittag-Leffler, 2025.

2. **Journées Arithmétiques 2025**, Conference on number theory, University of Luxembourg, 2025.

3. **DECANT**, Diophantine Equations, Combinatorics, Analysis in Number Theory: In honor of Trevor Wooley's 60th birthday, ICMS Edinburgh, 2025.

4. **DECANTER**, Diophantine Equations, Combinatorics, Analysis in Number Theory: Emerging Researchers, ICMS Edinburgh, 2025.

5. **CANT 2025**, Combinatorial and Additive Number Theory, CUNY, 2025.

6. **Integers 2025**, Conference in Honor of the 80th Birthdays of Melvyn Nathanson and Carl Pomerance, University of Georgia, 2025.

7. **MAGNTS 2025**, Midwest Arithmetic Geometry and Number Theory Series, The Ohio State University, 2025.

8. **Joint Mathematics Meeting 2025**, general mathematics conference, Seattle, 2025.

9. **Number Theory in the Americas 2**, workshop on number theory, Casa Matemática Oaxaca, 2024.

10. **CNTA XVI**, Canadian Number Theory Association XVI, University of Toronto, 2024.

11. **AMS central sectional meeting**, University of Wisconsin-Milwaukee, 2024.

12. **CANT 2024**, Combinatorial and Additive Number Theory, CUNY, 2024.

13. **Southern Regional Number Theory Conference**, Conference on number theory, LSU, 2024.

14. **PLANTS**, Pittsburgh Links among Analysis and Number Theory, University of Pittsburgh and Carnegie Mellon University, 2024.

15. **MAGNTS 2023**, Midwest Arithmetic Geometry and Number Theory Series, University of Michigan, 2023.

16. **RHB70**, Conference on analytic number theory and its interfaces to honour the 70th birthday of Roger Heath-Brown, University of Oxford, 2023.

17. **Journées Arithmétiques 2023**, Conference on number theory, University of Lorraine, 2023.

18. **MAGNTS 2022**, Midwest Arithmetic Geometry and Number Theory Series, University of Illinois Chicago, 2022.

19. **ELAZ 2022**, Conference on elementary and analytic number theory, Adam Mickiewicz University, 2022.

20. **UH Summer School on Dynamical Systems**, a workshop designed to introduce graduate students to the basics of dynamical systems and ergodic theory, 2018.

Seminars Attended

1. **Purdue Analytic Number theory and Harmonic Analysis**, weekly talks about recent research topics in analytic number theory and harmonic analysis, 2019-present.

2. **University of Houston Undergraduate Mathematics Colloquium**, weekly talks about topics in research mathematics aimed towards an undergraduate audience, 2016-2019.

3. **University of Houston Analysis Seminar**, weekly talks about recent research topics in analysis, 2016-2019.

4. **Deep learning using Tensorflow**, weekly talks covering the basics of deep learning to convolutional neural networks, and an introduction to the deep learning package Tensorflow, 2017.

Undergraduate Research Experience

- Provost Undergraduate Researcher, University of Houston.   Spring 2019
  - Title: **Applying reinforcement learning to graph Ramsey games.**
  - Supervised by Alan Haynes.
- Undergraduate Researcher (REU), Emory University.   Summer 2018
  - Title: **Combined reconstruction and classification with deep neural networks.**
  - Supervised by Lars Ruthotto.   Funded by NSF, DMS-1751636

Outreach & Mentorship

- **General**
  - Polymath Jr. 2025   Summer 2025
    Graduate Math Mentor to a group of undergraduates under the direction of Steven Miller. Project was on alternating MSTD sets and MDTS sets.
- **Purdue University**:
  - AWM Math Mentor Program   Fall 2024
    Graduate Mentor to graduate mathematics students.
  - Mathematics Graduate Representative   Fall 2022
    Host various social gatherings throughout the year, and serve as a representative of the mathematics graduate students to voice suggestions and complaints directly to the Mathematics Department administration.
  - Mathematics Mentoring Program   Fall 2022
    Graduate Mentor to undergraduate mathematics students.
  - Summer Research Opportunities Program   Summer 2022
    Graduate Mentor to incoming graduate students.
- **University of Houston**:
  - Pi Mu Epsilon Meeting Organizer   Spring 2017 - Spring 2019
- **Lone Star College-North Harris**:
  - Math Club Pi Day Organizer   Spring 2014 - Spring 2016

Languages

Spoken: English (native), Spanish (native). **Code**: C#, C++, Matlab, Python 3, LaTeX.