

# Daniel Flores

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## Research Interests

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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.

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## Education

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- **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
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## Publications

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### 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  $k$ th powers with distinct entries*, *Bulletin of the Australian Mathematical Society*, pp. 1–8, 2025. doi:10.1017/S0004972724001345

### Accepted Articles

- (2) *A circle method approach to  $K$ -multimagic squares*, to appear in the *Journal of the London Mathematical Society*. <https://arxiv.org/abs/2406.08161>

### Submitted

- (3) (Joint with Kiseok Yeon) *The Hasse principle for homogeneous polynomials with random coefficients over thin sets II*, 2024. <https://arxiv.org/abs/2506.01291>
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## Awards & Fellowships

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- **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

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## Teaching & Tutoring Experience

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• **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.

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## Invited Talks

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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  $k$ th powers with distinct entries*, Analysis Seminar, Washington University in St. Louis, Spring 2025.
3. *Existence of  $K$ -multimagic squares and magic squares of  $k$ th powers with distinct entries*, Algebra Seminar, Rice University, Spring 2025.
4. *Existence of  $K$ -multimagic squares and magic squares of  $k$ th powers with distinct entries*, Number Theory Seminar, Kansas State University, Spring 2025.
5. *Existence of  $K$ -multimagic squares and magic squares of  $k$ th 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  $k$ th powers with distinct entries*, Joint Mathematics Meeting: Math Alliance, Seattle Convention Center, Spring 2025.
7. *Existence of  $K$ -multimagic squares and magic squares of  $k$ th 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.

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## Submitted Talks

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1. *Existence of  $K$ -multimagic squares and magic squares of  $k$ th powers with distinct entries*, DECANter: Diophantine Equations, Combinatorics, Analysis in Number Theory: Emerging Researchers, ICMS Edinburgh, Summer 2025.
2. *Existence of  $K$ -multimagic squares and magic squares of  $k$ th powers with distinct entries*, 33èmes Journées Arithmétiques, University of Luxembourg, Spring 2025.
3. *Existence of  $K$ -multimagic squares and magic squares of  $k$ th powers with distinct entries*, Combinatorial and Additive Number Theory 2025, CUNY, Spring 2025.
4. *Existence of  $K$ -multimagic squares and magic squares of  $k$ th powers with distinct entries*, Integers Conference 2025, University of Georgia, Spring 2025.
5. *A circle method approach to  $K$ -multimagic squares*, Canadian Number Theory Association XVI, University of Toronto, Summer 2024.
6. *A circle method approach to  $K$ -multimagic squares*, Combinatorial and Additive Number Theory 2024, CUNY, Spring 2024.
7. *A quantitative Hasse principle for weighted quartic forms*, Southern Regional Number Theory Conference, LSU, Spring 2024.
8. *A quantitative Hasse principle for weighted quartic forms*, Pittsburgh Links among Analysis and Number Theory, University of Pittsburgh and Carnegie Mellon University, Spring 2024.

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## Attended Conferences

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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.

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## Seminars Attended

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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.

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## Undergraduate Research Experience

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- 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

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## Outreach & Mentorship

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- **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

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## Languages

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**Spoken:** English (native), Spanish (native). **Code:** C#, C++, Matlab, Python 3, L<sup>A</sup>T<sub>E</sub>X.