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
  Expected completion date: Spring 2025
  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

Accepted Articles

(2) *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, to appear in the Bulletin of the Australian Mathematical Society. https://arxiv.org/abs/2411.01091

Preprints

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

(4) *Bounds for the binary quartic Weyl sum*, 2024+. (In Progress)

Awards & Fellowships

- **Purdue University**:
  - Ross-Lynn Research Scholar Dissertation 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 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. *Existence of K-multimagic squares and magic squares of kth powers with distinct entries*, Number Theory Seminar, University of Göttingen, Fall 2024.
2. *A circle method approach to K-multimagic squares*, Number Theory Seminar, Stanford University, Fall 2024.
3. *A circle method approach to K-multimagic squares*, Number Theory Seminar, University of California in Davis, Fall 2024.
4. *A quantitative Hasse principle for weighted quartic forms*, AMS Central Sectional meeting, University of Wisconsin-Milwaukee, Spring 2024.
5. *A Gentle Introduction to the Circle Method*, Purdue Graduate Student Analysis Seminar, Purdue University, Fall 2023.
6. *Classification of noisy images with a coupled inversion-classification neural network.* LA-TX Undergraduate Mathematics Conference, LSU, Fall 2018.

Submitted Talks

1. *A circle method approach to K-multimagic squares.* Canadian Number Theory Association XVI, University of Toronto, Summer 2024.
2. *A circle method approach to K-multimagic squares.* Combinatorial and Additive Number Theory 2024, CUNY, Spring 2024.
3. *A quantitative Hasse principle for weighted quartic forms.* Southern Regional Number Theory Conference, LSU, Spring 2024.
4. *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. **Number Theory in the Americas 2**, workshop on number theory, Casa Matemática Oaxaca, 2024.
2. **CNTA XVI**, Canadian Number Theory Association XVI, University of Toronto, 2024.
3. **AMS central sectional meeting**, University of Wisconsin-Milwaukee, 2024.
4. **CANT 2024**, Combinatorial and Additive Number Theory, CUNY, 2024.
5. **Southern Regional Number Theory Conference**, Conference on number theory, LSU, 2024.
6. **PLANTS**, Pittsburgh Links among Analysis and Number Theory, University of Pittsburgh and Carnegie Mellon University, 2024.
7. **MAGNTS**, Midwest Arithmetic Geometry and Number Theory Series, University of Michigan, 2023.
8. **RHB70**, Conference on analytic number theory and its interfaces to honour the 70th birthday of Roger Heath-Brown, University of Oxford, 2023.
9. **Journées Arithmétiques**, Conference on number theory, University of Lorraine, 2022.
10. **MAGNTS**, Midwest Arithmetic Geometry and Number Theory Series, University of Illinois Chicago, 2022.
11. **ELAZ 2022**, Conference on elementary and analytic number theory, Adam Mickiewicz University, 2022.
12. **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

- **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.