

CATHERINE M. HSU

PERSONAL INFORMATION

Swarthmore College
Mathematics & Statistics
Swarthmore, PA

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Citizenship: U.S.A.

ACADEMIC POSITIONS

Assistant Professor, Swarthmore College, August 2021-present

Research Member, MSRI (UC Berkeley), January 2023-May 2023

Visiting Assistant Professor, Swarthmore College, August 2020-July 2021

Heilbronn Research Fellow, University of Bristol, October 2018-July 2020

EDUCATION

Ph.D. in Mathematics, University of Oregon, June 2018
Advisor: Ellen Eischen

M.S. in Mathematics, University of North Carolina at Chapel Hill, May 2015
Advisor: Ellen Eischen

B.A. in Mathematics, Rice University, May 2012

RESEARCH INTERESTS

Algebraic number theory, computational number theory, modular forms, congruences between modular forms, modularity theorems, visualizing mathematics, Apollonian circle packings

PUBLICATIONS

Research papers and preprints

1. “Explicit non-Gorenstein $R = \mathbb{T}$ via rank bounds II: Computation,” with P. Wake and C. Wang-Erickson. Preprint, arXiv:2209.00556 [math.NT], 50 pages, 2022. To appear in *Research in Number Theory* in the proceedings of ANTS-XV.
2. “Explicit non-Gorenstein $R = \mathbb{T}$ via rank bounds I: Deformation theory,” with P. Wake and C. Wang-Erickson. Preprint, arXiv:2209.00536 [math.NT], 57 pages, 2022. Submitted.
3. “Set with a twist,” with J. Ostroff and L. Van Meter. *Math Horizons*, 28.4 (2021): 20-23.
4. “Projectivizing Set,” with J. Ostroff and L. Van Meter. *Math Horizons*, 27.4 (2020): 12-15.

5. “Higher congruences between newforms and Eisenstein series of squarefree level.” *Journal de Théorie des Nombres de Bordeaux*, 31.02 (2019): 503–525.
6. “Two classes of number fields with a non-principal Euclidean ideal.” *International Journal of Number Theory*, 12.04 (2016): 1123–1136.

Work-in-progress

7. “Prime and almost-prime components in Apollonian circle packings,” with H. Friedlander, E. Fuchs, Piper H., D. Schindler, and K. Stange.

Expository writing

8. “Planting seeds for community,” with E. Eischen. To appear in *Notices of the American Mathematical Society*.
9. “Review of The Unwritten Rules of Professional Etiquette,” with A. N. Miller. *Notices of the American Mathematical Society*, 69 (2022), no. 5, 784-787.
10. “Wooden tiles for non-abelian Set.” In *Illustrating Mathematics*, edited by Diana Davis, American Mathematical Society, (2020): 40-41.

HONORS AND AWARDS

MAA-AWM Lecturer, Mathematical Association of America, 2021-2024

Faculty Research Support Award, Swarthmore College, November 2020

Research grant to host workshop in Summer 2023, Swarthmore College, August 2020

Jack and Peggy Borsting Award for Scholastic Achievement in Graduate Mathematics,
University of Oregon, June 2018

AAUW American Dissertation Fellowship, American Association for University Women
Awarded across all areas of study, July 2017-June 2018

University of Oregon Doctoral Research Fellowship, University of Oregon
Awarded across all areas of study, September 2017-June 2018

Most Outstanding Graduate Student Research Poster, Association for Women in
Mathematics Poster Competition, January 2017

Anderson Ph.D. Research Award, University of Oregon, June 2016

Johnson Travel Fellowship, University of Oregon, February 2016

GAANN Fellowship, Department of Education, January 2013-May 2015

Kenan-Biddle Partnership Grant, Duke University, January 2015

SELECTED TALKS

Invited conference talks

- Front Range Number Theory Day, April 2023*
- MSRI Connections Workshop: Algebraic Cycles, L-Values, and Euler Systems, Jan. 2023*
- Fifteenth Algorithmic Number Theory Symposium, August 2022
- AWM Research Symposium, June 2022
- Illustrating Number Theory and Algebra, October 2019
- The Eisenstein Ideal and Iwasawa Theory, June 2019
- Young Researchers in Algebraic Number Theory, October 2018
- Texas-Oklahoma Representations and Automorphic forms, April 2018

Invited MAA-AWM Lectures

- Indiana Sectional Meeting, April 2023*
- NJ Sectional Meeting, April 2022
- Intermountain Sectional Meeting, March 2022
- Iowa Sectional Meeting, October 2021

Invited seminar talks

- Simon Fraser University, February 2023*
- Johns Hopkins University, November 2022*
- Tulane University, October 2022*
- Louisiana State University, October 2022*
- University of Sheffield, November 2019
- CUNY Graduate Center, May 2017, September 2019
- University of California Irvine, May 2019
- University of Oregon, April 2017, April 2019
- University of Warwick, March 2019
- University of Bristol, February 2018
- University of Washington, December 2017
- Clemson University, September 2017
- Bryn Mawr College, August 2017

Colloquia

- Runnals Dinner Speaker at Colby College, October 2021
- Colby College Colloquium, October 2021
- Seattle University Colloquium, January 2020

*denotes an upcoming talk

SELECTED TEACHING EXPERIENCE

Assistant Professor at Swarthmore College

- Modern Algebra II Honors Seminar, Fall 2022
- Linear Algebra with Theory, Fall 2022
- Modern Algebra I, Spring 2022
- Number Theory, Fall 2021

Visiting Assistant Professor at Swarthmore College

- Linear Algebra, Spring 2021
- Calculus II, Fall 2020

Co-Lecturer at the University of Bristol

- Algebraic Number Theory (third and fourth-year students), Spring 2020

Instructor at MathILy-Er Summer Program

- Number theory, Methods of proof, p -adic numbers, Summer 2019
- Projective geometry, Number theory, Methods of proof, Summer 2018

Graduate Teaching Fellow at the University of Oregon

- Introduction to Probability and Statistics, Instructor of Record, Summer 2017
- Introduction to Abstract Algebra III, Teaching Assistant, Spring 2017
- Functions, Trigonometry, and Their Applications, Instructor of Record, Winter 2017

PROJECT LEADERSHIP

Level raising congruences involving Eisenstein series, August 2022

- co-leading project with C. Wang-Erickson
- six-person group that is part of the APAW Collaborative Research Workshop; designed to promote diverse collaborations

Math and Data Visualization, Spring 2022

- co-led project with A. Luby
- supervised one undergraduate student in a semester-long directed reading course about utilizing RStudio to visualize symmetric groups and other abstract mathematics

Algebra, Geometry, and Combinatorics in Set, Summer 2021

- co-led project with L. Van Meter
- supervised four undergraduate students in a summer research project exploring algebraic and combinatorial questions arising in variations of the card game Set

SERVICE*Conference and seminar co-organization*

- APAW Graduate Instructional and Collaborative Research Workshops, August 2022
- Philadelphia Area Number Theory Seminar, August 2020-present
- Heilbronn Number Theory Seminar, August 2018-January 2020
- UO Student Number Theory Seminar, December 2016-June 2018
- Joint Duke & UNC Student Mathematics Colloquium, November 2014-June 2015

Refereeing and reviewing

- Journal of Number Theory (1 paper refereed)
- Simons Foundation Proceedings (1 paper refereed)
- The American Mathematical Monthly (1 paper refereed)
- AMS's *Mathematical Reviews* (5 articles reviewed)

Outreach and mentoring

- Women in Numbers Member, May 2017-present
- UO AWM Reading Room Co-founder, May 2017-June 2018
- UO AWM Undergraduate Reading Program Co-chair, May 2016-August 2017
- UO AWM Undergraduate Reading Program Mentor, Sept. 2015-June 2018
- UO AWM Speaker Series Committee Member, September 2015-June 2018

Recent college and departmental service

- Student Life Committee, August 2021-present
- Swarthmore Puzzle Collective Co-organizer, August 2021-present
- Swarthmore Colloquium Co-organizer, August 2021-July 2022
- Swarthmore Community Building Team Member, August 2020-July 2021