Isa Chou

+1 (505)385-2856, ichou@illinois.edu

EDUCATION

BS, Mathematics,
University of Illinois Urbana-Champaign, expected May 2028

Undergraduate
Williams College, Massachussetts, 2024-2026

Dual Enrollment student
University of New Mexico, 2019-2024

RESEARCH EXPERIENCE

Prof. Alexandra Seceleanu CIMAT, 2025-present

Work in combinatorial aspects of commutative algebra at on characterizing Cohen-Macaulayness of binomial edge ideals. Part of an international REU in binomial edge ideals between CIMAT and UNL, supervised also by Eloísa Grifo, Jack Jeffries, Luis Núñez Betancourt, Alexandra Seceleanu.

- To be presented at JMM 2026; paper in revision
- Showed for closed and connected graphs, a binomial edge ideal is Cohen-Macaulay exactly when the graph contains no induced *cat graph*, which we defined.
- Characterized when a bipartite graph is isomorphic to an initial graph
- Showed associated Stanley-Reisner complexes are pure, shellable, and vertex decomposable when a closed, connected graph contains no induced cat.

Prof. Alexandru Buium UNM 2023-24

Work in p-derivation, an arithmetic analogue of differential geometry developed by Buium, where p-adic integers act as functions, and Fermat quotients as derivatives.

- Searched for an antiderivative.
- Formulated theoretical sum, product, and other integral laws given such an antiderivative.

Dr Burton Newman 2019-20

Studied average distance of isogeny graphs of elliptic curves, in the cryptosystem developed by Jao, de Feo, and Plut (2011)

- Wrote code in Sagemath to generate, read, and display supersingular isogeny graphs, heavily based on code by Kristin Lauter et. al., (2019)
- Determined upper bound of average distance on isogeny graphs, then curve-fit a trend.

RELEVANT COURSES

UIUC
Algebraic Combinatorics. Graduate Abstract Algebra. Graph theory.

Williams College
Probability theory. Independent study: Preliminary Arizona Winter School in Algorithms in Number Theory. Supervised by Prof. Aaron Williams. Commutative algebra. Independent study: Nonlinear Algebra and Toric Varieties - supervised by Ralph Morrison. Project in XTR cryptography. Independent Study: Preliminary Arizona Winter School in Local Fields and Root systems. Supervised by Prof. Leo Goldmakher.

University of New Mexico
Applied ODEs, 1 Semester Number Theory, 2 Semesters Real Analysis, 1 Semester Abstract Algebra, Fourier Analysis and Wavelets

TALKS EXPOSITORY WORK & TEACHING

1. *The Cat in the Graph (Working Towards Cohen-Macaulayness of Binomial Edge Ideals)* JMM 2026, AMS-SIAM-MAA Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, Winter 2026
2. *Tessellations in the Context of Topology and Art*, Williams funded class I developed and taught, Winter 2024
3. Teaching Assistant, MATH 374: Topology, Fall 2024
4. *Pontrjagin Duality and the Discrete Fourier Transform*, collaborative expository paper with Luca Luppes and Miguel Berkopec presented to UNM graduate students, Spring 2024
5. *Tao's analysis in p-adics*, a layman introduction to p-adic numbers modeled after Tao's real analysis books presented to undergraduate students studying real analysis. Spring 2024
6. *Mathematical Beauty, as told by Euclid, Erdos, and Furstenberg*, talk in mathematical philosophy at the Southwest Undergraduate Mathematics Research Conference (SUnMaRC). Spring 2024
7. *Presenting Mathematics at Open Chalk: how to build an inclusive mathematics community* Invited panelist, UNM Spring Teaching Conference, Spring 2024

8. *The World of p-Adics!*, *The Mathematics of Music*,and *Increasingly Complicated Proofs of the Infinitude of Primes*, 3 lectures for high-school math camp C&!. Summers 2023-24.

READINGS

1. *The Arithmetic of Elliptic Curves*, Joseph Silverman, Spring 2026
2. *Algebraic Curves*, William Fulton, Spring 2026
3. *Local Fields*, Jean Pierre Serre, Spring 2026
4. *Knots and Primes*, Masanori Morishita, Fall 2025
5. *Differentiating by 13*, Jack Jeffries, Fall 2025
6. *Notes on p-adic Geometry*, M. Bocardo & C. Garay, Summer 2025
7. *Adeles and Algebraic Groups*, Weil, Fall 2024
8. *Tate's Thesis*, Cassels & Fröhlich, Fall 2024
9. *Adeles and Tate's Thesis*, lecture notes for Rutgers MATH 574, Summer 2024
10. *Intro to Galois Theory*, Andrew Baker, Spring 2024
11. *p-Adic Analysis and Zeta Functions*, Neal Koblitz, Fall 2023 (Supervised by Prof. Buium)
12. *Elliptic curve cryptography*, taught by Yo'av Rieck, University of Arkansas, Summer 2022
13. *Quantum computing,* taught by Rolfe Schmidt, *Signal*, Summer 2022
14. *The Prime Number Theorem & the transcendence of* π, taught by Yo'av Rieck, University of Arkansas, Summer 2021

ACADEMIC ACTIVITIES

Williams Math Book Club Fall 2024-Present

- Founded & modeled Williams-funded club after Directed Reading Program
- Ran four weekly book-sessions and one monthly all-club gathering
- Gained nearly 50 members, and became affiliated with the Williams Schow science library

AWM at Williams Fall 2024-Present

- Freshman Representative & Board Member