SIYU PENG

(385)394-8439 | pengs14@mit.edu | https://www.linkedin.com/in/pengs14/

EDUCATION AND COURSEWORK

Massachusetts Institute of Technology **Expected May 2027**
Bachelor of Science in Mathematics, Minor in Computer Science GPA: 4.9/5.0 (Major GPA: 4.9/5.0)

COURSEWORK

Algebra and Number Theory: Algebraic Geometry I-II (graduate), Algebraic Combinatorics, Commutative Algebra (graduate), Seminar in Arithmetic Dynamics, Algebra I-II
Analysis and Topology: Complex Analysis, Real Analysis, Intro to Topology, Probability and Random Variables
Theoretical Computer Science: Design and Analysis of Algorithms, Intro to Algorithms

RESEARCH AND EXPOSITORY WORKS

The K-Hall Algebra Product October 2025 - Present
Mentor: Miguel Moreira *Massachusetts Institute of Technology*

· The main goal of this project is to understand how the product in a K-Hall algebra behaves, starting from the concrete example PGL_n.
· Utilized SageMath to compute the image, expressed as the tensor of Schur polynomials, of elements of $R(\mathrm{PGL}_n)$ under this product

Rational Functions of Degree Three over Finite Fields May 2025 - Present
Mentor: Xiang-dong Hou *University of South Florida REU in Applied Algebra*

· Produced a classification of degree-3 rational functions over finite fields under PGL-equivalence, extending existing results (previously known only for even characteristic) to all characteristics $p \geq 5$ by looking at the cross ratios of ramification points of such functions.
· Utilized SageMath and Mathematica to develop computational experiments, detect structural patterns, and verify conjectures.
· Currently writing preprint for journal submission.

Undergraduate Seminar: Reduction in Arithmetic Dynamics May 2025
Professor: Robin Zhang *Massachusetts Institute of Technology*

· Wrote an expository paper on the behavior of periodic points of arithmetic dynamical systems under good and bad reduction (PDF)

Directed Reading Program: An Invitation to Arithmetic Geometry by D. Lorenzini Jan 2025
Mentor: Anlong Chua *Massachusetts Institute of Technology*

Directed Reading Program: The Arithmetic of Elliptic Curves by J. Silverman Jan 2024
Mentor: Murilo Corato Zanarella *Massachusetts Institute of Technology*

PRESENTATIONS

Peng, S., Qiang, F. (January, 2026). A Study of Rational Functions of Degree Three over Finite Fields, *Joint Mathematics Meetings*, Washington, DC.

Peng, S., Qiang, F. (July, 2025). Classifying Polynomials and Rational Functions under AGL-Equivalence, *Applied Algebra Days Workshop*, Tampa, FL.

Peng, S. (May, 2025). Reduction in Arithmetic Dynamics, *Seminar in Arithmetic Dynamics*, Cambridge, MA.

Peng, S. (April, 2025). Height Functions and Northcott's Theorem, *Seminar in Arithmetic Dynamics*, Cambridge, MA.

Peng, S. (February, 2025). Elliptic Curves and their Torsion Points, *Seminar in Arithmetic Dynamics*, Cambridge, MA.

Peng, S. (January, 2025). Introduction to Plane Curves, *MIT Directed Reading Program Symposium*, Cambridge, MA.

Peng, S. (August, 2024). Elliptic Curves, *PROMYS*, Boston, MA.

Chen, J., **Peng, S.** (July, 2024). Introduction to Cryptography, *PROMYS*, Boston, MA.

Peng, S., Rajagopal, I. (August, 2024). Introduction to Algebraic Topology, *PROMYS*, Boston, MA.

Jayaswal, T., **Peng, S.** (July, 2024). Projective Geometry, *PROMYS*, Boston, MA.

Peng, S. (January, 2024). Elliptic Curves and Hasse's Bound, *MIT Directed Reading Program Symposium*, Cambridge, MA.

Peng, S. (July, 2023). Bezout's Theorem, *PROMYS*, Boston, MA.

TEACHING AND GRADING EXPERIENCES

Lecturer, IAP Proofs Workshop February 2026
Massachusetts Institute of Technology *Cambridge, Massachusetts*

· Developed and delivered a 1.5-hour lecture on group theory as part of an introductory proofs workshop

Academic Chair, MIT Web Lab January 2026
Massachusetts Institute of Technology *Cambridge, Massachusetts*

· Delivered lectures and hosted hands-on workshops covering various full-stack development concepts
· Held office hours providing technical guidance and debugging support
· Coordinated lecture schedules and providing feedback on lecture dry runs

Grader, 6.1220: Design and Analysis of Algorithms Fall 2025
Massachusetts Institute of Technology *Cambridge, Massachusetts*

Head Counselor, PROMYS Summer 2024
Program in Mathematics for Young Scientists *Boston, Massachusetts*

· Delivered hour-long expository talks (minicourses) accompanied by comprehensive lecture notes on advanced topics (cryptography, elliptic curves, projective geometry)
· Graded number theory and Galois theory problem sets, meeting daily with students to discuss feedback
· Led and coordinated a team of 20 counselors, delegating responsibilities to develop academic and social programming for 80 high school students.

Grader, 18.901: Introduction to Topology Fall 2024
Massachusetts Institute of Technology *Cambridge, Massachusetts*