

Kyle Roke

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EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

2022-Present

Class of 2026

B.S. Mathematics (anticipated 2026)

5.0 GPA

Notable Coursework

Geometry of Manifolds

Algebra I/II, Commutative Algebra

Representation Theory

Algebraic Topology I/II

Kan Seminar on Algebraic Topology

Algebraic Geometry I/II

COMMONWEALTH HIGH SCHOOL

2018-2022

Graduated 2022

5.05 GPA

RESEARCH

Research in category theory under Peter May at the UChicago Math REU

2025-Present

Read literature on operads, pseudoalgebras, and Segal infinite loop space machines

Worked on new research into proving conjectures about permutative categories and Segal Γ -categories

Worked toward producing a better infinite loop space machine to construct highly structured spectra

Co-authored a paper on our results

Ongoing work on further research

Directed reading project in algebraic topology at MIT with Natalia Pacheco-Tallaj

2025

Directed reading and problem solving focused on generalized cohomology theories, vector bundles, spectral sequences, and more to understand Atiyah & Rees' "Vector Bundles on Projective 3-Space"

UROP+ at MIT in chromatic homotopy theory at MIT under Jeremy Hahn

2024

Read existing literature on chromatic homotopy theory and ring spectra

Performed computations of power operations of MU using Maple

Conjectured and proved statements about E-infinity ring spectra using power operations

Authored a paper on our results and suggested a counterexample to chromatic blueshift conjecture

Reading project in systolic geometry at MIT with Jonathan Zung

2024

Directed reading and problem solving across varied topics in topology and geometry

TEACHING EXPERIENCE

Undergraduate Assistant for 18.701: Algebra I

Fall 2025

MIT Math Department; taught by Henry Cohn
Graded problem sets and exams
Hosted office hours and exam review sessions

Undergraduate Assistant for 18.702: Algebra II**Spring 2025**

MIT Math Department; taught by Ju-Lee Kim
Graded problem sets and exams
Hosted office hours and exam review sessions

Grader for 18.701: Algebra I**Fall 2023**

MIT Math Department; taught by Zhiwei Yun
Graded problem sets and exams

EXPOSITORY TALKS

Symmetric monoidal categories, operadic categories, and Segal categories**August 7, 2025**

UChicago Math REU
With Jiasen Liu, Hongyi Zhang, and Keming Zhou

Selick on Odd-Primary Torsion in $\pi_*(S^3)$ **May 9, 2025**

MIT Kan Seminar

Quillen on Model Categories and Homotopical Algebra**Apr 7, 2025**

MIT Kan Seminar

Adams on the Construction of the Stable Homotopy Category**Feb 28, 2025**

MIT Kan Seminar

Vector bundles on complex projective 3-space**Jan 31, 2025**

MIT Directed Reading Program Symposium

SKILLS

Software: Maple, Python, Java, Latex

LEADERSHIP EXPERIENCE

MIT Men's Ultimate Frisbee Team Captain
Vice President of Mass. Theta Chapter of Pi Lambda Phi Fraternity

2023-Present**2024**