

Akshay Sant

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Research Profile

Second-year graduate student in the Mathematics Ph.D. program at the University of Rochester. My primary research interests are computational number theory and arithmetic geometry. I am also interested in harmonic analysis, learning theory, and connections between number theory and machine learning, including machine-learning approaches to arithmetic geometry.

Broader interests include algebraic geometry, modular forms, elliptic curves, arithmetic statistics, adversarial machine learning, and scientific data processing.

I currently work with Prof. Thomas Tucker on computational algebraic number theory projects and collaborate with Prof. Alex Iosevich on number theory and learning theory projects.

Education

Spring 2025–Present	University of Rochester, Rochester, NY, USA Second-year graduate student in the Mathematics Ph.D. program. Completed all requirements for the M.A. in Mathematics ; the degree is expected to be conferred in August 2026. Passed all Ph.D. qualifying examinations and continue in the Mathematics Ph.D. program. • <i>Spring 2025</i>: Algebra II (Galois Theory), Analysis II (Complex Analysis and Sobolev Spaces), and Algebraic Geometry (Algebraic Curves). • <i>Summer 2025</i>: Reading course in algebraic geometry with Prof. Thomas Tucker. • <i>Fall 2025</i>: Algebraic Number Theory, Measure Theory, Algebraic Topology, and General Topology; participated in a research project in Prof. Thomas Tucker’s group. • <i>Spring 2026</i>: Differential Geometry, Probability Theory, and Algebraic Geometry (Schemes and Abelian Varieties).
2021–2024	Rheinland-Pfälzische Technische Universität (RPTU) Kaiserslautern-Landau, Germany M.Sc. Mathematics International , final grade: 1.4 (Sehr gut / Excellent). Master’s thesis: Modularity and Fermat’s Last Theorem , grade: 1.3 . • Studied elliptic curves, modular forms, Galois representations, and abelian varieties. • Studied the modularity theorem and its role in the proof of Fermat’s Last Theorem. • Used the modular curve $X_0(38)$ as a running example, computing its genus, Jacobian decomposition, and an explicit model using computational and theoretical methods.
Winter 2022–23, 2023–24	University of Bonn, Department of Mathematics, Bonn, Germany Partial cross-registered student. Coursework included Analytic number theory, the Langlands Program, Algebraic Geometry (Schemes), and Algebra II (group cohomology and introductory local and global class field theory).
2015–2018	Ramnarain Ruia Autonomous College, University of Mumbai, India B.Sc. Mathematics , aggregate: 94.96% ; College Rank: 2 . Coursework included mathematics, statistics, and physics, followed by advanced specialization in pure and applied mathematics.
2013–2015	K.M. Agrawal College of Science, Commerce and Arts, Kalyan, India Higher Secondary Education (10+2), aggregate: 88.15% ; College Rank: 3 .
2003–2013	Shree Gajanan Vidyalaya, Kalyan, India Secondary School, aggregate: 90.94% ; top ten in school ranking.

Preprints and Publications

2026	W. Burstein, A. Iosevich, and A. Sant , “Elliptic curves, Fourier ratio, and sampling complexity.” <i>Preprint</i> , arXiv:2607.08051 [math.NT]. Studies the normalized Frobenius trace of the Legendre family through Fourier complexity and proves linear lower bounds for sparse Fourier approximation and bounded-precision sampling.
2026	W. Burstein, A. Iosevich, and A. Sant , “Arithmetic functions and learning theory.” <i>Preprint</i> , arXiv:2604.14482 [math.NT]; doi:10.48550/arXiv.2604.14482 . Connects analytic number theory with computational learning theory by establishing Fourier-ratio and sample-complexity lower bounds for classes containing the Möbius function.

2025

Sogo P. Sanon, Akshay Sant, and Hans D. Schotten, “[Defending Against Adversarial Attacks in 6G: Practical Mitigation Approach](#).”

Published in the proceedings of the 2025 IEEE International Balkan Conference on Communications and Networking (BalkanCom), Ljubljana, Slovenia, and available through IEEE Xplore.

Academic Appointments and Teaching

Summer 2026	Adjunct Instructor, Department of Mathematics, University of Rochester Currently teaching MATH 162: Calculus IIA . As the instructor, I prepare and deliver lectures, write assessments and course materials, and grade student work.
Spring 2025–Present	Teaching Assistant and Grader, Department of Mathematics, University of Rochester - Classroom teaching assistant for MATH 141 (Calculus I) and MATH 164 (Multivariable Calculus). - Grader for MATH 235 (Proof-Based Linear Algebra) and MATH 448 (Computational Topology).
Apr 2020–Sep 2020	Assistant Teacher, Tambe Sir’s Classes, Dombivli, India Taught Abstract Algebra, Riemann Integration, Sequences and Series, Real Analysis, and Commutative Algebra.
Aug 2018–Aug 2019	Junior Lecturer, Shete’s Institute, Kalyan, India Taught single-variable and multivariable calculus and probability; designed and administered student assessments.
Jun 2016–Jun 2018	Assistant Teacher, Tambe Sir’s Classes, Dombivli, India Taught Abstract Algebra, Linear Algebra, and Elementary Number Theory.

Research and Professional Experience

Jun 2024–Dec 2024	Research Assistant, German Research Center for Artificial Intelligence (DFKI), Kaiserslautern - Studied adversarial attacks in machine learning, with emphasis on classification, mitigation strategies, optimization, and performance evaluation for secure AI. - Coauthored the BalkanCom paper listed above.
Nov 2023–Dec 2024	Student Research Assistant, Fraunhofer ITWM, Kaiserslautern - Generated and analyzed large geometric datasets, including seismic-survey data, using Python and SQL. - Developed methods for indexed querying, slicing, and retrieval; benchmarked performance against Fraunhofer software. - Explored new approaches to large-scale geometric data processing.
Apr 2021–Sep 2023	Student Research Assistant, Department of Mathematics, RPTU Kaiserslautern-Landau Contributed to the OSCAR computer algebra system for computational algebraic geometry through programming and literature review.

Technical and Language Skills

Programming	Python, C++, Julia (intermediate to advanced); SQL, MATLAB, R, HTML/CSS (basic).
Computer algebra	Magma, Macaulay2, Singular, and OSCAR (contributor).
Research tools	L ^A T _E X, GitHub, scientific computing and data analysis, mathematical writing.
Languages	English (CEFR C1; IELTS 7.5), German (B2.1 coursework), Marathi (mother tongue), Hindi (native), Sanskrit and Japanese (beginner).
Interests	Chess, table tennis, tabla, photography and video editing, literature, poetry, and article writing; former photographer and columnist for an undergraduate college magazine.

Awards and Achievements

2024	Graduate School of Mathematics Graduation Scholarship, RPTU April–May 2024.
2022–2024	Deutschlandstipendium German government scholarship in cooperation with private sponsors; total support: EUR 5,400.
2022–2024	DAAD-STIBET Scholarship Scholarship for master’s studies at RPTU; total support: EUR 12,000.

2021–2022	Graduate School of Mathematics Scholarship and Research Assistantship RPTU; total support: EUR 10,332.
2015–2018	INSPIRE Scholarship Awarded by the Department of Science and Technology, Government of India, during undergraduate studies.
2016	Madhava Mathematics Competition Mumbai topper; among 31 candidates nationwide invited to the Nurture Camp at ISI Bangalore.
2018	IIT-JAM Mathematics Top 200 All-India rank.
2020	TIFR Graduate School Entrance Among the top 76 candidates shortlisted nationwide for TIFR CAM.

Selected Talks and Presentations

May 2026	Arithmetic functions and complexity theory International Conference On Fractals And Related Areas 2026
April 2026	Modularity and Fermat’s last theorem Graduate seminar at the University of Rochester
March 2026	Selected Algebraic Computations in SageMath University of Rochester; talk on computational algebraic geometry and computer algebra systems.
Jul 2024	Modularity and Fermat’s Last Theorem Invited talk, Joint Block Seminar on Algebraic Number Theory, RWTH Aachen, Germany.
Sep 2023	An Arithmetic Function Related to the Twin Prime Conjecture Speed talk, Max Planck Institute for Mathematics, Bonn.
2023	Crash Course on Sheaves Guest lecture in a Riemann Surfaces course, RPTU Kaiserslautern.
May 2022	Partitions, Young Diagrams, and Tableaux Representation Theory of the Symmetric Group seminar, RPTU Kaiserslautern.
Nov 2021	Ext and Tor Groups Algebraic Geometry seminar, RPTU Kaiserslautern.
May 2020	Introduction to Topological Groups Annual Foundation School I.
Jul 2018	Approaches to the Infinitude of Primes Visiting Students Research Program, TIFR Mumbai.

Conferences, Schools, and Academic Service

Mar 2026	Arizona Winter School Tucson, Arizona.
Fall 2025	Arithmetic and Algebraic Geometry Seminar Organizer, University of Rochester.
Sep–Nov 2025	Preliminary Arizona Winter School Analysis and implementation of algorithms in number theory.
Mar 2025	The Legacy of John Tate, and Beyond Harvard University, Cambridge, Massachusetts.
2022–2024	Selected schools and conferences Hodge Theory and Shimura Varieties (University of Duisburg-Essen); Joint Block Seminar on Algebraic Number Theory; Young Number Theorists in Bonn; Arithmetic Statistics and Ergodic Theory; Nikolaus School on Computational Algebraic Geometry; Modular Forms in Number Theory and Beyond.
2018–2020	Selected schools and research programs Annual Foundation School I (IIT Bombay/TIFR); Workshop on Algebraic Number Theory (Assam University); Visiting Students Research Program (TIFR Mumbai); Madhava Nurture Camp (ISI Bangalore).