Sanchayan Dutta

Curriculum Vitae (updated November 2026)

Department of Mathematics
University of California, Davis
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Education

2022–present **Ph.D. candidate**, *University of California, Davis*, Mathematics
Advised by Greg Kuperberg. Advanced to candidacy June 17, 2024.
Cumulative UC GPA 3.841/4.000.

2021–2022 **Graduate study**, *University of California, Davis*, Computer Science
Entered UC Davis in Fall 2021 and transferred to Mathematics in 2022.

2017–2021 **B.E.**, *Jadavpur University*, Electronics and Telecommunication Engineering

Research interests

My research is in quantum coding theory, computational mathematics, and theoretical computer science. I study the classification and enumeration of classical and quantum codes using algebraic and computational methods. I also work on the mathematical foundations of machine learning and optimization on manifolds.

Internship Experience

Summer 2024 **Research intern**, *Technical University of Munich*
Supervised by Prof. Suvrit Sra. Research on the mathematics of transformers and learning optimization algorithms.

Summer 2023 **Research intern**, *Harvard University*, School of Engineering and Applied Sciences
Supervised by Prof. Anurag Anshu. Research on sum-of-squares lower bounds and the no low-energy trivial states theorem.

Summer 2018 **Undergraduate research assistant**, *IISER Kolkata*, Department of Physical Sciences
Summer Student Research Program. Research on quantum algorithms and quantum circuit design.

Writing

Publication titles and arXiv identifiers link to the corresponding papers.

9. **Enumerating Pauli Stabilizer Codes through Ten Qubits.** With Greg Kuperberg. Preprint (2026).
8. **Isometry Classes of Codes via Hall Polynomials.** Preprint (2026).
7. **Active Inference as Context Acquisition for AI Agents.** With Sai Niranjan Ramachandran and Suvrit Sra. Preprint (2026). arXiv 2608.19202.
6. **A Note on Clifford Stabilizer Codes for Ising Anyons.** Preprint (2025). arXiv 2503.08736.
5. **Toward Generalizable Learning of All (Linear) First-Order Methods via Memory Augmented Transformers.** With Suvrit Sra. Preprint (2024, revised 2025). arXiv 2410.07263.
4. **Riemannian Bilevel Optimization.** With Xiang Cheng and Suvrit Sra. Preprint (2024). Under review at *SIAM Journal on Mathematics of Data Science*. arXiv 2405.15816.
3. **Quantum Machine Learning: A Review and Current Status.** With N. Mishra et al. *Data Management, Analytics and Innovation*, Advances in Intelligent Systems and Computing **1175**, 101–145 (2021, first published online 2020).

2. **Quantum Circuit Design Methodology for Multiple Linear Regression.** With Adrien Suau, Sagnik Dutta, Suvadeep Roy, Bikash K. Behera, and Prasanta K. Panigrahi. *IET Quantum Communication* **1**(2), 55–61 (2020).
1. **Euler Number and Percolation Threshold on a Square Lattice With Diagonal Connection Probability and Revisiting the Island-Mainland Transition.** With Sugata Sen, Tajkera Khatun, Tapati Dutta, and Sujata Tarafdar. *Frontiers in Physics* **7**, Article 61 (2019).

Talks

June 2023 **SoS Lower Bounds, SS-HDX and NLTS.** Anurag Anshu's research group, Harvard SEAS.

Nov. 2022 **An Introduction to Homological Codes with an Emphasis on Fourier and Poincaré Dualities.** Isaac Kim's research group, UC Davis.

Service

2022 Co-organized the UC Davis Quantum Algebra & Computing Seminar Group with Daniel Tobias.

- Co-organized the UC Davis Computational Complexity & PCPs Reading Group with Daniel Tobias.

Teaching

University of California, Davis

Teaching assistant

- 2026 Fall
  - MAT 17B, Calculus for Biology and Medicine. With Dowman Varn.
- 2026 Winter
  - MAT 21B, Integral Calculus. With Dowman Varn.
- 2025 Fall
  - MAT 21B, Integral Calculus. With Dowman Varn.
- 2025 Winter
  - MAT 21B, Integral Calculus. With Jesús De Loera.
- 2024 Fall
  - MAT 21A, Differential Calculus. With John Challenor and Yoon Nho.
- 2024 Winter
  - MAT 21C, Partial Derivatives and Series. With Thomas Strohmer.
- 2023 Fall
  - MAT 22A, Linear Algebra. With Martin Luu.
  - MAT 168, Optimization. With Luis Rademacher.
- 2023 Spring
  - MAT 21B, Integral Calculus. With Elena Fuchs.
  - MAT 150C, Modern Algebra. With Daping Weng.
- 2023 Winter
  - MAT 21D, Vector Analysis. With Blake Temple.
  - MAT 111, History of Mathematics. With William Tavernetti.

Selected graduate coursework

Algebra and topology. Algebra (MAT 250A–C), Topology (MAT 215A–B), Differential Topology (MAT 239), Geometric Topology (MAT 216), and Lie Groups and Lie Algebras (MAT 261).

Analysis and theoretical computer science. Analysis (MAT 201A–B), Information Theory and Coding (EEC 266), and Computer Science Theory (ECS 289A).