

# Curriculum Vitae

## Satvik Saha

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### Education

- August 2019 – June 2024 **BS-MS in Mathematical Sciences**, *Indian Institute of Science Education and Research, Kolkata*  
CGPA – 9.7/10, ranked 1<sup>st</sup> in the Department of Mathematics and Statistics.  
Teaching Assistant for Mathematics I, Statistics I.
- 2019 **ISC**, *Delhi Public School, Megacity, Kolkata*  
Class 12 – 93.5%, Indian School Certificate (ISC)
- 2017 **ICSE**, *Delhi Public School, Megacity, Kolkata*  
Class 10 – 94.2%, Indian Certificate of Secondary Education (ICSE)

### Research Interests

Optimal Transport, Nonparametric Statistics, Data Depth Statistics.

### Awards and Achievements

- 2024 Awarded the Director's Gold Medal for securing the highest CGPA in the Department of Mathematics and Statistics.
- 2023 Awarded the *MITACS Globalink Research Internship* (GRI) scholarship.
- 2017 Awarded the *Kishore Vaigyanik Protsahan Yojana* (KVPY) scholarship, with rank 649 (SA).

### Conferences and Camps

- 2023 Attended the *Canadian Applied and Industrial Mathematics Society (CAIMS) Annual Meeting* at the University of New Brunswick, Fredericton.
- 2017 Attended the *National Science (Vijyoshi) Camp* at IISc Bangalore, as a KVPY fellow.

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## Projects

August 2023 **Statistical Depths for Multivariate and Functional Data with Applications** (MS Thesis)  
– May 2024

**Supervisor:** Dr. Anirvan Chakraborty, IISER Kolkata

Studied the construction of numerous depth functions on finite-dimensional as well as function spaces, along with their properties. Examined applications in exploratory data analysis, testing, classification, clustering, and outlier detection tasks. Briefly focused on the concept of local depth, and used this to propose a new kernel based regression procedure. ([thesis](#), [presentation](#))

May 2023 **Combining in-host and inter-host viral infection dynamics**  
– July 2023 **Supervisor:** Prof. James Watmough, University of New Brunswick

Studied existing agent-based models for the spread of viral infections in a population, as well as ODE-based models for the dynamics of viral infections within a host. Developed a model which operates on both scales, generated and analysed simulation data. Attended the Annual Meeting of the Canadian Society of Applied and Industrial Mathematics (CAIMS 2023).

August 2022 **Multi-Task Learning in Natural Language Processing**  
– April 2023 **Supervisor:** Dr. Kripabandhu Ghosh, IISER Kolkata

Studied techniques for identifying, quantifying, and neutralizing bias in word embeddings, in the context of Natural Language Processing (NLP). Worked on adapting a Multi-Task Learning (MTL) model for this task.

May 2022 **The Poincaré Theorem for Fundamental Polygons**  
– July 2022 **Supervisor:** Dr. Somnath Basu, IISER Kolkata

Studied topics in algebraic topology. Explored tilings of the hyperbolic plane as covering spaces of genus 2 and above surfaces, and how this allows such manifolds to be realized as surfaces of constant negative curvature.

July 2021 **The Stone-Weierstrass Theorem**  
**Supervisor:** Dr. Somnath Basu, IISER Kolkata

Studied topics in introductory group theory, analysis, and topology. Presented a generously illustrated proof of the Stone-Weierstrass theorem. ([notes](#), [presentation](#))

April 2020 **Age stratified SIQR model for the COVID-19 pandemic**  
**Supervisor:** Prof. Ranjit Kumar Upadhyay, IIT Dhanbad

Studied the basic SIQR compartmental model in epidemiology, in the context of the emerging COVID-19 pandemic. Modified this model by subdividing each compartment into age groups, with varying degrees of interaction amongst each other. Applied this model (using numerical simulations in python) to understand trends in infection rates/mortality in countries with different age structures in their population. ([paper](#))

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## Publications

- 2024 Saha, S., Gupta, S., Dutta, S., Chatterjee, S. “Characterising Solutions of Anomalous Cancellation.” *Resonance*, **29**, 51–68. [doi:10.1007/s12045-024-1737-2](https://doi.org/10.1007/s12045-024-1737-2)
- 2020 Upadhyay, R.K., Chatterjee, S., Saha, S., Azad, R.K. “Age-group-targeted testing for COVID-19 as a new prevention strategy.” *Nonlinear Dynamics*, **101**, 1921–1932. [doi:10.1007/s11071-020-05879-x](https://doi.org/10.1007/s11071-020-05879-x)

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## Software Skills

**Languages** Proficient in C, Python, R, MATLAB  
Familiar with C++, Java, Mathematica

**Tools** Git, HTML/CSS/JS, L<sup>A</sup>T<sub>E</sub>X, Numpy/Scipy, Pytorch, Tensorflow, Typst

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## Student Interests

**Chess** Played for the IISER Kolkata Chess Team in the *Inter IISER Sports Meet* (IISM) 2019, as well as Revival 2021.

**Coding** Contributed to writing and maintaining the [welearn-bot](#) project, a command line interface for IISER Kolkata’s learning platform.

Designed and wrote the [website](#) of Identity, the Maths Club of IISER Kolkata, former maintainer.

Wrote the popular [typst-theorems/ctheorems](#) package for creating numbered environments in the typesetting language [Typst](#), current maintainer.

**Other** Founding member of Identity, the Maths Club of IISER Kolkata; organized and coordinated events and competitions, designed problems, contributed articles and blog posts.

Part of the winning team in the Mathematics Treasure Hunt, 2020, organized by IISER Pune.