

# SHUBHAJIT DEY

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## EDUCATION

Bachelor of Science - Master of Science, BSMS Dual-degree

Indian Institute of Science Education and Research, Bhopal

Major in Mathematics | Minor in Data Science

2019 - 2024

## SKILLS & INTERESTS

- General**    Approximation theory | Eigenvalue problems & Numerical analysis on differential equations | Optimization problems | Optimization algorithms in classical machine learning
- Other**    Computational Matrix Theory & Mathematical programming | Theoretical deep learning
- Language**    **Fluent** : Python, C++ | **Familiar** : R
- Libraries**    **Fluent** : NumPy, Matplotlib, Pandas, SciPy, Scikit-Learn, PyTorch  
                    **Familiar** : Qiskit, Librosa
- Tools**     $\LaTeX$  | Wolfram Mathematica | MATLAB
- Analytics**    Jupyter Notebook | RStudio | Excel

## PROFESSIONAL EXPERIENCES

- Teaching Fellow**    Taught undergrads and aided host Prof. Partha Pratim Das in the Discreet Mathematics course at *Ashoka University, New Delhi*.    Jan 2025 - Present
- Teaching Fellow**    Taught undergrads and aided host Prof. Bhargab Bhattacharya in the QRMT course at *Ashoka University, New Delhi*.    Sept 2024 - Dec 2024
- Graduate Researcher**    Worked under the guidance of Dr. Janosch Ortmann & Dr. Walter Rei on extension of the Mitacs Globalink project.    May 2024 - Sept 2024

## RESEARCH EXPERIENCES & PROJECTS

- Analysis on ODE & Approx. Theory**    **Theoretical & Computational considerations of Sturm-Liouville systems. (MS dissertation project)**    Aug 2023 - May 2024
  - **Supervisor** : Dr. Anandateertha Mangasuli & Dr. Ambuj Pandey, IISERB
  - Studied the theory on SL systems, in particular Oscillation Theory, asymptotics and completeness of eigenfunctions.
  - Conducted relevant numerical experiments to visualise Fourier approximation & Chebyshev approximation, including discrete computation of Chebyshev coefficients (pseudo spectral method).
  - **Thesis** : [10.13140/RG.2.2.13890.39364](#)
- Operational Research**    **On signature based algorithmic algebra involved in stochastic programming.**    May 2023 - Aug 2023 + May 2024 - Sept 2024
  - **Supervisor** : Dr. Janosch Ortmann & Dr. Walter Rei, ESG UQAM
  - Investigated signature-based algorithms and their role in discarding redundant calculations during Gröbner basis computations.
  - Performed theoretical surveys, numerical experiments and contributed towards explaining heuristics of signature based algorithms.
  - **Report** : soon to be available on ArXiv as a preprint.
- Topology**    **On characterizing compact and dense subspaces of  $C(X, \mathbb{R})$ .**    May 2022 - Aug 2022
  - **Supervisor** : Dr. Anandateertha Mangasuli, IISERB
  - Studied Ascoli's theorem, Weierstrass approximation theorem and Stone-Weierstrass theorem.
  - Primary objective was to explore, analyse and present the derivation & proof of relevant results.
  - **Report** : [ResearchGate](#)

- **Real Analysis**      **On Taylor's approximation and some associated theorems on convergence of power series.**      📅 Dec 2021 - Jan 2022
  - **Supervisor** : Dr. Anandateertha Mangasuli, IISERB
  - Thoroughly analysed the crucial concepts behind the mentioned topics.
  - Further, solved problems to deduce important areas of application.
  - **Report** : [ResearchGate](#)
- **Artificial Intelligence**      **Acoustic scene classification using auditory dataset.**      📅 Aug 2021 - Dec 2021
  - Built a system which employed a CNN based model (PyTorch framework) to classify audio scenes.
  - The system included handling audio data using Librosa frameworks and usage of spectrograms (Mel) as input to the neural network employed.
  - **Report** : [arXiv:2112.13450](#)
  - **Code** : [GitHub Repo](#)

## READING PROJECTS

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- **Deep Maths**      **A preliminary survey on Deep Maths.**
  - Rigorous literature survey was done based on an experiment conducted on advancing mathematical intuition using AI. Code deployed was critically analysed to reproduce the base results.
  - **Report** : [10.13140/RG.2.2.18971.34085](#)

## CONFERENCES & WORKSHOPS

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- **Jan 2025**      Attended **exSPLORe 2025**, a five-day workshop cum conference conducted jointly by **Safexpress Centre for Data, Learning and Decision Sciences** & Google.
- **Dec 2020**      Attended 8th **INDIAN SCHOOL OF LOGIC AND ITS APPLICATIONS [ISLA 2020]**, a virtual school conducted jointly by **Association of Logic in India (ALI)** & IISERB.

## SCHOLASTIC ACHIEVEMENTS

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- **2023**      Awarded The Mitacs Globalink Research Grant (CAD 10,000) for an on-site research project in Montréal.
- **2019**      Cleared ISI B.Math entrance examination - round 1 (clearance for only top 150 out of 50k+ applicants).
- **2019**      Obtained **94%** in AISSCE (CBSE class XII boards examination).
- **2017**      Obtained **10 CGPA** (out of 10) in SCE (CBSE class X boards examination).

## OTHER ACHIEVEMENTS

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- **2020**      **Second Runners Up** at SBI NUMERO YONO QUIZ, *Central India region*.
- **2017**      **Third Runners Up** at CBSE HERITAGE INDIA QUIZ, *National Semi Finale*.
- **2016**      **First Runners Up** at BHARAT KO JANO QUIZ COMP., *National Finale*.
- **2014**      **Gold Medal** for Intra State Rapid-Fire chess tournament, *Assam*.

## POSITIONS OF RESPONSIBILITY

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- **2022**      **Event Coordinator & Core-team member** for the Interactive Quiz Event in the annual outreach programme of IISER-B, *responsibility as a host and an event manager*.
- **2022**      **Department Representative** for the mathematics 2019 batch, *responsibility to represent the entire batch to the department & solve relevant issues and grievances*.
- **2020**      **Coordinator** at IISERB QUIZ CLUB for 2 consecutive terms, *responsibility to conduct infotainment quizzes*.

\*All links and hyperlinks are underlined.