Sai Sriharsha Indukuri

Research Fellow · Mathematics

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Education

Indian Institute of Technology, Bombay — *Mumbai, Maharashtra*

Ph.D. Mathematics — *August 2023 - present*

- Prime Minister's Research Fellow
- NPTEL PMRF Teaching Assistant

National Institute of Science Education and Research — *Bhubaneswar, Orissa*

Integrated M.Sc. Mathematics — *July 2018 - May 2023*

- Master's Thesis Advisor: Dr. Sutanu Roy
- CGPA : 8.71 (out of 10)
- Minor: Computer Science

FIITJEE Junior College — *Hyderabad, Telangana*

11th and 12th grade — *June 2016 - May 2018*

- Board of Education: Telangana State Board
- Aggregate Score: 96.7 %

Glendale Academy International — *Hyderabad, Telangana*

10th Grade — *July 2008 - March 2016*

- Board of Education: IGCSE
- Aggregate Score: 88 %

Research Interests

My broad interests are in Operator Algebras, Geometry, and Topology. A field that has close connections with these three disciplines is Non-Commutative Geometry, which I am keen on exploring in greater depth.

Internships/Summer Schools

Jun 2019 **Programming Intern**, IIIT Hyderabad, (Advisor: Dr.Suresh Purini)

Jul 2022 **Summer Programme in Mathematics**, Harish-Chandra Research Institute, Allahabad

Seminar Courses / Research Projects

Asymptotics of Weyl's Law , Fall 2023 (manuscript under preparation)

Weyl's law describes the asymptotic behavior of eigenvalues of the Laplacian on a compact Riemannian manifold. We are investigating whether the remainder term can be improved for a certain class of Riemannian manifolds.
(joint work with Dr.Ritwik Mukherjee)

Topological K-Theory, Fredholm Operators and their Index , Fall 2022 - Spring 2023, (Master's Thesis)

Definition of complex K-Theory of topological spaces and how it extends to an arbitrary C^*-algebra, Bott Periodicity, bounded Fredholm Operators on a separable Hilbert space, their index and how they relate to the K-theory of a topological space through a result known as the Atiyah-Janich theorem

Introduction to Hilbert C^*-Modules , Spring 2022

Studied a generalization of Hilbert Spaces called Hilbert Modules and their properties and a description of the Multiplier Algebra of a C^*-algebra using the Hilbert module structure of the C^*-algebra.

Fourier Analysis of Functions on S^1, $\mathbb{R}$ and Finite Abelian Groups , Fall 2021

Introduced to Fourier Series of periodic functions, Fourier transform of real-valued functions on $\mathbb{R}$ and of functions defined on finite abelian groups; eventually led to the "Pontryagin Dual".

Talks and Presentations

- Delivered (online) presentation, which introduced the notion of the dual of an abelian group (in particular: finite, S^1 and $\mathbb{R}$) and the Fourier Transform of functions on them to conclude the project on Fourier Analysis (NISER, December 2021)
- Delivered some lectures on Hilbert Modules to peers interested in Operator Algebras (NISER, Spring 2022)
- Delivered an introductory lecture to a larger audience, on Hilbert C^* Modules to conclude project on Hilbert C^* Modules (NISER, May 2022)
- Delivered lecture titled ”Vector Bundles and K-Theory” as part of Semester Project Presentation (NISER, December 2022)
- Delivered an introductory lecture on Fredholm Operators and their index for final Master’s Thesis Presentation (NISER, April 2023)

Upper Level Coursework in Mathematics

- Operator Algebras
- Differential Topology
- Algebraic Topology
- Introduction to Harmonic Analysis
- Non-Linear Analysis
- Partial Differential Equations
- Measure Theory
- Representations of Finite Groups
- Algebraic Number Theory

Computer Science Experience

- **Languages:** C++, Python
- **Libraries:** STL, Numpy, Pandas, Matplotlib, Scikit-Learn
- **Projects:**
  - Programmed a Neural Net in Python that detects craters on images of the moon’s surface
  - Programmed a small game in Python called ”Alien Invasion”
- **Coursework Includes:**
  - Data Structures and Algorithms
  - Theory of Computation
  - Design and Analysis of Algorithms
  - Introduction to Cryptography
  - Introduction to Machine Learning
  - Approximation and Randomized Algorithms

Achievements/Scholarships

2023	**Prime Minister's Research Fellowship (PMRF)**, Ministry of Human Resource Development, India
2023	**Best Master's Thesis (Mathematics), for thesis titled "Topological K-Theory and Beyond"**, School of Mathematical Sciences, NISER
2023	**Qualified GATE Mathematics**, Top 1 percentile in India
2022	**Qualified CSIR-UGC-NET in Mathematics for Junior Research Fellowship**, Top 1 percentile in India
2018	**JEE Advanced**, Top 5 percentile in India
2018-2023	**DISHA Scholarship**, Department of Atomic Energy, India
2015	**BSE International Finance Olympiad, Silver Medal**, Ranked in top 20 of the country and was invited to the Bombay Stock Exchange to participate in the finals

Teaching Experience

Fourier Analysis and Its Applications *NPTEL*
PMRF Teaching Assistant *Jan 2024 - April 2024*

Language Tests

- English - TOEFL iBT score: 111/120 (2022)
- French - Passed DELF A1 (basic French) conducted by Alliance Française Hyderabad (2016)

Extracurricular Activities

- Chess enthusiast, Former member of NISER Chess Team (won medals representing NISER)
- Basketball enthusiast, Former member of the NISER Basketball Team