

Brahadeesh Sankarnarayanan

Assistant Professor (Grade II), Department of Mathematics
Indian Institute of Technology Jodhpur, NH 62 Nagaur Road,
Karwar 342030, Jodhpur District, Rajasthan, India

brahadeesh@iitj.ac.in · +91 291 280 1469

[Website](#) · [Google Scholar](#) · [ORCID](#) · [MathSciNet](#) · [zbMATH Open](#)

RESEARCH INTERESTS

I work in combinatorics. My current interests are in spectral extremal graph theory, intersection graphs of paths, and combinatorial matrix theory. My past work covers list coloring of surface-embedded graphs, intersecting set systems, and the rank of structured matrices arising from tournaments.

EDUCATION

Ph.D. (Mathematics) 07/2018 – 08/2024

Indian Institute of Technology (IIT) Bombay

Thesis: “Some problems in combinatorics: Excursions in graph colorings and extremal set theory”

Advisor: Niranjan Balachandran

CPI: 8.89/10.0

BS–MS (Dual) Degree (Major in Mathematics) 07/2012 – 06/2017

Indian Institute of Science Education and Research (IISER) Bhopal

Thesis: “Automorphic forms and Tate’s thesis”

Advisor: Karam Deo Shankhadhar

CPI: 9.31/10.0

EMPLOYMENT

Assistant Professor (Grade II) 09/2025 – present

Department of Mathematics, IIT Jodhpur

Research Associate 05/2025 – 09/2025

Department of Mathematics, IIT Hyderabad

Project: “Spectral Theory of Signed Graphs”

Principal Investigator: M. Rajesh Kannan

Institute Post-Doctoral Fellow 08/2024 – 02/2025

Department of Mathematics, IIT Bombay

Mentor: Niranjan Balachandran

Project Assistant 09/2017 – 11/2017

Department of Mathematics, IISER Bhopal

Project: “Self-dual representations and signs”

Principal Investigator: Kumar Balasubramanian

PUBLICATIONS

REFEREED JOURNAL ARTICLES

Niranjan Balachandran, Brahadeesh Sankarnarayanan.

5-list coloring toroidal 6-regular triangulations in linear time.

Discrete Applied Mathematics **386** (2026), 75–103, [doi:10.1016/j.dam.2026.01.032](https://doi.org/10.1016/j.dam.2026.01.032),

[arXiv:2106.01634](https://arxiv.org/abs/2106.01634), [MR5028701](https://mathscinet.ams.org/mathscinet/item.do?reqID=MR5028701), [Zbl 08187875](https://zbmath.org/journal/Zbl/08187875).

Niranjan Balachandran, Shagnik Das, Brahadeesh Sankarnarayanan.

Bounded fractional intersecting families are linear in size.

The Electronic Journal of Combinatorics **32** (2025), no. 3, #P3.34, 10 pp., [doi:10.37236/12900](https://doi.org/10.37236/12900),

[arXiv:2402.14981](https://arxiv.org/abs/2402.14981), [MR4949605](https://mathscinet.ams.org/mathscinet/item.do?reqID=MR4949605), [Zbl 1572.05240](https://zbmath.org/journal/Zbl/1572.05240).

Niranjan Balachandran, Brahadeesh Sankarnarayanan.

Low-rank matrices, tournaments, and symmetric designs.

Linear Algebra and its Applications **694** (2024), 136–147, [doi:10.1016/j.laa.2024.04.006](https://doi.org/10.1016/j.laa.2024.04.006),

[arXiv:2401.14015](https://arxiv.org/abs/2401.14015), [MR4736676](https://mathscinet.ams.org/mathscinet/item.do?reqID=MR4736676), [Zbl 1539.05071](https://zbmath.org/journal/Zbl/1539.05071).

Niranjan Balachandran, Srimanta Bhattacharya, Brahadeesh Sankarnarayanan.
Almost full rank matrices arising from transitive tournaments.
Linear and Multilinear Algebra **72** (2024), no. 2, 153–161, doi:10.1080/03081087.2022.2158168,
MR4703565, Zbl 1533.05147.

Niranjan Balachandran, Srimanta Bhattacharya, Krishn Vishwas Kher, Rogers Mathew,
Brahadeesh Sankarnarayanan.
On hierarchically closed fractional intersecting families.
The Electronic Journal of Combinatorics **30** (2023), no. 4, #P4.37, 17 pp., doi:10.37236/11651,
arXiv:2211.02540, MR4672585, Zbl 1533.05268.

Niranjan Balachandran, Srimanta Bhattacharya, Brahadeesh Sankarnarayanan.
An ensemble of high-rank matrices arising from tournaments.
Linear Algebra and its Applications **658** (2023), 310–318, doi:10.1016/j.laa.2022.11.004,
arXiv:2108.10871, MR4513895, Zbl 1506.15034.

Brahadeesh Sankarnarayanan.
Note on 4-coloring 6-regular triangulations on the torus.
Annals of Combinatorics **26** (2022), no. 3, 559–569, doi:10.1007/s00026-022-00573-8,
arXiv:2106.01037, MR4473892, Zbl 1497.05098.

Niranjan Balachandran, Brahadeesh Sankarnarayanan.
The choice number versus the chromatic number for graphs embeddable on orientable surfaces.
The Electronic Journal of Combinatorics **28** (2021), no. 4, #P4.50, 20 pp., doi:10.37236/10263,
arXiv:2102.06993, MR4394670, Zbl 1486.05101.

Kumar Balasubramanian, K. S. Senthil Raani, Brahadeesh Sankarnarayanan.
Self-dual representations of $SL(2, F)$: an approach using the Iwahori–Hecke algebra.
Communications in Algebra **47** (2019), no. 10, 4210–4215, doi:10.1080/00927872.2019.1581211,
MR3975999, Zbl 1432.20031.

CONFERENCE PROCEEDINGS

Niranjan Balachandran, Brahadeesh Sankarnarayanan.
5-list coloring toroidal 6-regular triangulations in linear time. Extended abstract.
CALDAM 2023. In: Amitabha Bagchi, Rahul Muthu (eds.) *Algorithms and Discrete Applied Mathematics*,
Lecture Notes in Computer Science, vol. 13947, pp. 134–146, Springer, Cham (2023),
doi:10.1007/978-3-031-25211-2_10, MR4573050, Zbl 07728658.
The full version appeared in *Discrete Applied Mathematics* **386** (2026), 75–103 (above).

MANUSCRIPTS IN PREPARATION

Niranjan Balachandran, Shagnik Das, Brahadeesh Sankarnarayanan, Umesh Shankar.
An extremal problem for vertex intersection graphs of paths.
2026, in preparation.

RESEARCH SUPERVISION

DOCTORAL STUDENTS

Vishnu Kumar Department of Mathematics, IIT Jodhpur	enrolled Autumn 2025–26
Yash Chawda Department of Mathematics, IIT Jodhpur	enrolled Spring 2025–26

EXECUTIVE M.TECH. PROJECTS

Rayipalli Prakash School of Artificial Intelligence and Data Science, IIT Jodhpur Project: “GNN-Based Automatic Calorie Identification from Food Images”	10/2025 – present
Md. Parvez Rahaman School of Artificial Intelligence and Data Science, IIT Jodhpur Project: “AI-Based Text Summarization and Tone Rewriting System Using BART and T5”	10/2025 – present

FELLOWSHIPS, AWARDS & HONORS

Institute Post-Doctoral Fellowship IIT Bombay	08/2024 – 02/2025
National Board for Higher Mathematics (NBHM) Research Award Department of Atomic Energy, Government of India	08/2018 – 07/2023
Joint CSIR–UGC National Eligibility Test for Junior Research Fellowship CSIR – Human Resource Development Group; All-India Rank 20 in Mathematical Sciences	07/2017
Director’s Gold Medal IISER Bhopal Awarded for outstanding all-round achievement and leadership in the BS–MS graduating class	06/2017
Rashtrapati Bhavan In-Residence Programme for Scholars from IITs, IISERs, and IISc Invited by the President of India to represent IISER Bhopal	06/2016
Science Academies’ Summer Research Fellowship Indian Academy of Sciences, Indian National Science Academy, and National Academy of Sciences, India	05/2015 & 05/2016
World Science Conference, Israel Hebrew University of Jerusalem; member of a 15-person Indian contingent	08/2015
INSPIRE Scholarship for Higher Education Department of Science & Technology, Government of India	08/2012 – 06/2017

INVITED TALKS

Competency-based Learning in Mathematics Session at the STEM Teacher Training Program, organized by the Centre for Education Technology (in association with Jodhpur Zila Parishad and Shiksha Vibhag), IIT Jodhpur	04/2026
Counting the infinite National Mathematics Day Guest Lecture, Government College Makroniya Bujurg, Sagar, Madhya Pradesh (online)	12/2025
Sunflowers and symmetric designs Research Seminar, Department of Mathematics, IIT Jodhpur	04/2025
Sunflowers and symmetric designs RA Seminar, Theoretical Statistics and Mathematics Unit, Indian Statistical Institute, Bangalore Centre	11/2024
Sunflowers, tournaments, and symmetric designs IPDF Seminar, Department of Mathematics, IIT Bombay	05/2024
Some recent work on fractional intersecting families CSE Research Symposium, IIT Palakkad	03/2024

CONFERENCE PRESENTATIONS

Nonstandard analysis: a gentle introduction Discussion Meeting on Number Theory and Combinatorics, Evolve Back, Coorg	12/2025
Bisection-closed families, tournaments, and symmetric designs Geometry, Probability, and Algorithms, International Centre for Theoretical Sciences, Bengaluru	05/2025
Some recent work on fractional intersecting families Meru Annual Combinatorics Conference, Graphic Era Hill University, Bhimtal Campus	06/2024
5-list coloring toroidal 6-regular triangulations in linear time Conference on Algorithms and Discrete Applied Mathematics (CALDAM), Dhirubhai Ambani Institute of Information and Communication Technology, Gandhinagar	02/2023

EVENTS ORGANIZED

Career Opportunities Beyond Academia One-day interaction session with industry mathematicians Department of Mathematics, IIT Jodhpur	03/2026
An Introductory Workshop on the Lean Theorem Prover	02/2026

Three-day workshop led by T. V. H. Prathamesh (Krea University);
co-organized with Dilpreet Kaur and Kriti Goel
Department of Mathematics, IIT Jodhpur

TEACHING EXPERIENCE

INSTRUCTOR: IIT JODHPUR

MAL2040 Design and Analysis of Experiments Spring 2025–26
49 students; overall instructor rating 3.70/5.0 (mean), median 4 across all dimensions

TEACHING ASSISTANT: IIT HYDERABAD

MA5020 Functional Analysis Autumn 2025–26

TEACHING ASSISTANT: IIT BOMBAY

SI 419 Combinatorics	Autumn 2024–25, Autumn 2021–22
SI 416 Optimization	Spring 2021–22
MA 205 Complex Analysis	Autumn 2021–22, Autumn 2020–21, Autumn 2019–20
MA 207 Differential Equations II	Autumn 2020–21, Autumn 2019–20
MA 108 Differential Equations	Summer 2020–21, Spring 2019–20
MA 106 Linear Algebra	Spring 2020–21, Spring 2019–20
MA 111 Calculus II	Spring 2020–21

OTHER TEACHING AND MENTORING

Masterminds Program (Trainer)	2023–24, 2024–25
UAE IMO selection camp, Ministry of Education, UAE Topics: combinatorics and number theory	
Self-Assessment Team (Member)	09/2023 – 12/2023
Mathematics Training and Talent Search Programme (MTTS)	
Online Foundation Course in Mathematics (Mentor)	08/2023 – 09/2023
Mathematics Training and Talent Search Programme (MTTS)	
Online Short Course in Linear Algebra: Application View (Mentor)	07/2023
Mathematics Training and Talent Search Programme (MTTS)	
Study-Help Room (Co-organizer)	2023
Department of Mathematics, IIT Bombay Weekly drop-in math help for BS and MSc students	
TA Skill Enhancement & Training (Master TA)	10/2022 – 11/2022
Parimal and Pramod Chaudhari Centre for Learning and Teaching, IIT Bombay	
A Basic Course in Number Theory (TA)	07/2020 – 10/2020
NPTEL Online Certification course	

PROFESSIONAL SERVICE

MEMBERSHIPS

Life Member, The Indian Mathematical Society	05/2026 – present
Life Member, Mathematics Teachers' Association (India)	05/2026 – present
Affiliate Member, American Mathematical Society	01/2026 – present
Advisory Board Member, Heliyon Mathematics (Cell Press)	09/2024 – 02/2025

REVIEWING

Indian Journal of Pure and Applied Mathematics	12/2025 – present
---	-------------------

Acta Informatica	11/2025 – present
Proceedings – Mathematical Sciences (Indian Academy of Sciences)	04/2024 – present
Mathematical Reviews / MathSciNet	03/2023 – present
zbMATH Open	01/2022 – present
Conference on Algorithms and Discrete Applied Mathematics (CALDAM)	10/2020 – present

INSTITUTIONAL SERVICE

IIT JODHPUR

Faculty Advisor, Mathematics Society Board of Departmental Societies	09/2025 – present
Member, Departmental Undergraduate Committee (DUGC) Department of Mathematics	09/2025 – present
Member, Department-level committee for projection of new B.S. programme B.S. in Mathematics and Computing, Department of Mathematics	10/2025 – present

IIT BOMBAY

Coordinator, Students' Seminar Department of Mathematics	01/2023 – 05/2023
--	-------------------

IISER BHOPAL

President, Students Activity Council	02/2016 – 01/2017
Coordinator, Mathematics Club	08/2013 – 07/2015

CONFERENCES, WORKSHOPS & EXTERNAL COURSES ATTENDED

Indo-Polish Pre-Conference School on Algorithms and Combinatorics IIT Dharwad	02/2026
Discussion Meeting on Number Theory and Combinatorics Evolve Back, Coorg	12/2025
Topics in Geometric Combinatorics (NCM Workshop) Chennai Mathematical Institute	06/2025
Meru Annual Combinatorics Conference BITS Pilani, K. K. Birla Goa Campus	05/2025
Geometry, Probability, and Algorithms International Centre for Theoretical Sciences, Bengaluru	05/2025
HDXs and Codes International Centre for Theoretical Sciences, Bengaluru	04/2025
Lean for the Curious Mathematician International Centre for Theoretical Sciences, Bengaluru	04/2025
Sparse graphs: treewidth, planarity, bounded expansion (GIAN) IIT Dharwad	02/2025
Combinatorial Methods in Enumerative Algebra International Centre for Theoretical Sciences, Bengaluru	12/2024
Discrete Integrable Systems International Centre for Theoretical Sciences, Bengaluru	10/2024
Meru Annual Combinatorics Conference Graphic Era Hill University, Bhimtal Campus	06/2024
A First Second Course in the Probabilistic Method IIT Palakkad	02/2024
Conference on Algorithms and Discrete Applied Mathematics (CALDAM)	02/2023

Dhirubhai Ambani Institute of Information and Communication Technology, Gandhinagar

Indo-Dutch Pre-Conference School on Algorithms and Combinatorics

02/2023

Dhirubhai Ambani Institute of Information and Communication Technology, Gandhinagar

Meru Annual Combinatorics Conference

05/2023

Pondicherry University