Amitesh Datta

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Personal Information

- Date of Birth: 1995
- Citizenship: Australia

Employment

2020 - 2022 **Lecturer in Mathematics**,
Princeton University.

Education

2014 - 2019 **Ph.D. Mathematics**,
Princeton University.

2010 - 2014 **Ph.B.(Hons.)(Science)**,
Australian National University,
GPA: 7.00/7.00.

Academic Awards and Fellowships

2022 **The Excellence in Teaching Award**,
Princeton University,
(awarded to four faculty members for teaching a course in Spring, 2021).

2014 **The Bradford H. Arnold*42 and Mary Ellen Arnold Fellowship**,
Princeton University,
(awarded to select incoming mathematics graduate students).

2010 - 2012 **Dean of Science Commendation**,
Australian National University.

2010 **Hanna Neumann Prize for Best First Year Mathematics Student**,
Australian National University.

Research

1. **The complete classification of isotopy classes of degree three symplectic curves in $\mathbb{CP}^2$ via a novel algebraic theory of braid monodromy** (`https://arxiv.org/abs/2303.05281`) (97 pages)
2. **An explicit formula for the coefficients of the Alexander and Jones polynomials of closed 3-braids and generic closed 4-braids directly in terms of a braid word** (in preparation) (>50 pages)
3. **A strong characterization of the entries of the Burau matrices of 4-braids: The Burau representation of the braid group B_4 is faithful almost everywhere** (`https://arxiv.org/abs/2209.10826`) (121 pages)
4. **A novel connection between integral binary quadratic forms and knot polynomials** (`https://arxiv.org/abs/2204.13660`) (13 pages)
5. **The braid group B_3 in the framework of continued fractions** (`https://arxiv.org/abs/2008.02262`) (20 pages)
6. **On the Burau representation of the braid group B_4.** ProQuest LLC, Ann Arbor, MI, 2020. Thesis (Ph.D.)-Princeton University (`https://www.proquest.com/docview/2378078915`) (80 pages)

Selected Talks

April, 2023 **Classifying plane curves and symplectic 4-manifolds using braid groups: The symplectic isotopy conjecture in $\mathbb{CP}^2$**,
Topology Seminar, Princeton University,
Geometry and Topology Seminar, Duke University,
Geometry/Topology/Dynamics Seminar, Boston College (BC),
Geometry/Topology Seminar, Brown University,
Geometry and Topology Seminar, Massachusetts Institute of Technology (MIT),
Geometry and Topology Seminar, Rutgers University - New Brunswick,
Geometry - Topology Seminar, University of Maryland at College Park (UMD).

Mar. 2023 **Classifying plane curves and symplectic 4-manifolds using braid groups: The symplectic isotopy conjecture in $\mathbb{CP}^2$**,
Topology and Geometric Group Theory Seminar, Cornell University.

Feb. 2023 **Does the Jones polynomial of a knot detect the unknot? A novel approach via braid group representations and class numbers of number fields**,
Geometry and Topology Seminar, Michigan State University (MSU).

Dec. 2022 **Does the Jones polynomial of a knot detect the unknot? A novel approach via braid group representations and class numbers of number fields**,
Topology Seminar, University of California, Los Angeles (UCLA).

Nov. 2022 **Does the Jones polynomial of a knot detect the unknot? A novel approach via braid group representations and class numbers of number fields**,
Geometry and Topology Seminar, California Insitute of Technology (Caltech),
Geometry and Topology Seminar, Georgia Institute of Technology (Georgia Tech).

Oct. 2020 **Is the braid group B_4 a group of 3×3-matrices?**,
Geometry and Topology Seminar, Yale University,
Topology Seminar, Brandeis University.

Nov. 2019 **Is the braid group B_4 a group of 3×3-matrices?**,
Topology Seminar, Princeton University,
Geometry and Topology Seminar, Massachusetts Institute of Technology.

April, 2017 **The Torelli group and the Johnson homomorphism**,
Informal Topology Seminar, Princeton University.

Oct. 2015 **Polynomials, representations and stability**,
Graduate Student Seminar, Princeton University.

March, 2015 **The 23rd stable homotopy group of spheres has a cyclic summand of order 65,520**,
Informal Topology Seminar, Princeton University.

Feb. 2015 **The Steenrod realization problem**,
Informal Topology Seminar, Princeton University.

Dec. 2014 **The topology of 4-manifolds**,
Informal Topology Seminar, Princeton University.

Nov. 2014 **Braid groups and categorification**,
Graduate Student Seminar, Princeton University.

May, 2013 **The classification of symplectic toric manifolds**,
Differential Geometry Seminar, Australian National University.

Oct. 2012 **The Rauch comparison theorem**,
Differential Geometry Seminar, Australian National University.

Teaching

I have taught the following courses at Princeton University:

Spring, 2022 **MAT100: Calculus Foundations (Course Head and Sole Instructor)**.

Fall, 2021 **MAT103: Calculus I (Instructor)**.

Spring, 2021 **MAT204: Advanced Linear Algebra and its Applications (Course Head and Sole Instructor)**.

Fall, 2020 **MAT103: Calculus I (Instructor)**.

Spring, 2020 **MAT202: Linear Algebra and its Applications (Instructor)**.

I have precepted/graded the following courses at Princeton University:

Spring, 2019 **Introduction to Graph Theory (Grader and Office Hours)**.

Fall, 2015 - 2018 **Topology (Grader and Office Hours)**.

Spring, 2017 **Advanced Linear Algebra and its Applications (Preceptor and Grader)**.

Spring, 2016 and 2018 **Algebraic Topology (Guest Lecturer and Grader)**.

I have tutored (taught material, worked problems in weekly tutorials, and graded assignments) the following courses at the Australian National University:

2013 **Algebra 3: Algebraic Curves**.

2013 **Analysis 3: Functional Analysis, Spectral Theory and Applications**.

2013 **Analysis 2: Topology, Lebesgue Integration and Hilbert Spaces**.

2012 **Algebra 3: Lie groups and Lie Algebras**.

2012 **Analysis 2: Topology, Lebesgue Integration and Hilbert Spaces**.

2011 **Algebra 3: Algebraic Number Theory**.

Student Supervision at Princeton University

Spring, 2021 **Michael Gintz**,
Junior Thesis: Configuration spaces and representation stability.

Service and Outreach at Princeton University

2022 **Formal Offer by the Office of the Dean of the College (ODOC) to serve as Faculty Advisor at Yeh College**,
I was offered the position of faculty advisor at Yeh College beginning Fall, 2022 by the ODOC, based on my teaching and mentoring record of undergraduate students at Princeton University. Yeh College is the newest residential college at Princeton University, opening in Fall, 2022. A description of the role of faculty advisor is at https://odoc.princeton.edu/advising/advising-residential-colleges/faculty-advisers.

2022 **Formal Invitation to be the Faculty Speaker at the Undergraduate Student Government (USG) Mental Health Initiative (MHI)**,
I gave a speech to various sectors of campus (faculty, administrators, staff, and students) on how to facilitate positive change for the mental health of undergraduate students.

2018 **Social Chair on the Lawrence Apartments Committee (Elected)**,
I organized social events for families with children living in the residential community.

2017 - 2018 **Social Chair on the Graduate Student Government (Elected)**,
I organized social events for graduate students at Princeton University, including evening socials, summer barbecues and the annual furniture drive.

2017 - 2018 **Graduate Student Representative on the Council of the Princeton University Committee (CPUC) (Elected)**,
I served as one of four graduate students on the CPUC. A description of the CPUC is at https://cpuc.princeton.edu.

2016 - 2019 **Member of the Mathematics Department Graduate Student Committee (Invited)**,
I fostered communication between graduate students and faculty in the mathematics department through my active role in the mathematics graduate student body, and meetings with other members of the committee, faculty and staff, and the department chair once a semester.

2014 - 2016 **Mathematics Department Representative on the Graduate Student Government (GSG) (Invited)**,
I served as the representative of the mathematics graduate students in the GSG.

2014 - 2018 **Princeton University Mentoring Möbius Leader**,
I mentored and guided undergraduate mathematics majors and undergraduate students with an interest in mathematics. For example, I advised them on REU and graduate school applications, life as a mathematician, the undergraduate mathematics curriculum at Princeton, and how to start in mathematics research.

Languages

- English (Native)
- Spanish (Advanced)
- Polish (Intermediate)