

Debanjana Kundu

Curriculum Vitae

Last Updated: November 6, 2021

PERSONAL DETAILS

Birth January 6, 1993
Address PIMS, 4176-2207 Main Mall, Vancouver, BC, V6T 1Z4 Canada
Phone (+1) 437-344-2592
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EDUCATION

Class X 2008
CBSE (India)
All India Rank 2

Class XII 2010
CBSE (India)
Top 1% in class XII

BS-MS Dual Degree 2010-2015
Indian Institute of Science Education and Research, Mohali, India
CGPA 9.7

MA PhD 2015–2020
University of Toronto, Toronto, Canada

EMPLOYMENT

Université de Montréal Fall 2020
CRM-ISM PostDoc, Thematic Program: Cohomology in Arithmetic

University of British Columbia, Vancouver January 2021–
December 2022
PIMS PostDoc Fellow

PUBLICATIONS/ PREPRINTS

- Growth of Fine Selmer Groups in Infinite Towers
Canadian Mathematics Bulletin (2020) Volume 63 / Issue 4 pp. 921-936.
- Growth of p -Fine Selmer Groups and p -Fine Shafarevich-Tate Group in $\mathbb{Z}/p\mathbb{Z}$ -Extensions
Journal of the Ramanujan Math Society (2021) Volume 36, No. 1.
- Growth of Fine Selmer Groups in Uniform pro- p Extensions
Annales Mathématiques du Québec (2021) Volume 45, pp. 347-362.
- Perfect Powers that are Sums of Squares of an AP (with V. Patel)
Rocky Mountain Journal of Mathematics (2021) Volume 51 / No. 3 pp. 933-949.
- On an Analogue of Kida's Formula for Fine Selmer Groups
Journal of Number Theory 222 (2021): 249-261.

6. Anticyclotomic μ -Invariants of Residually Reducible Galois Representations (with A. Ray)
accepted for publication (Journal of Number Theory)
7. Statistics for Iwasawa Invariants of Elliptic Curves (with A. Ray)
accepted for publication (Transactions of the AMS)
8. Control Theorems of Fine Selmer Groups (with M. F. Lim)
accepted for publication (Journal de Théorie des nombres de Bordeaux)
9. On the fine Selmer groups of modular forms and duality (with J. Hatley, A. Lei, and J. Ray)
pre-print available upon request, submitted
10. Structure of fine Selmer Groups in p -adic Lie Extensions (with R. Sujatha)
pre-print available upon request, submitted
11. Iwasawa Invariants for elliptic curves over \mathbb{Z}_p -extensions and Kida's Formula (with A. Ray) *pre-print available on arXiv, submitted*
12. Non-vanishing modulo p of Hecke L -values over imaginary quadratic fields (with A. Lei)
pre-print available upon request, submitted
13. Statistics for anticyclotomic Iwasawa invariants of elliptic curves (with J. Hatley and A. Ray) *pre-print available on arXiv, submitted*
14. Statistics for Iwasawa Invariants of Elliptic Curves II (with A. Ray)
pre-print available on arXiv, submitted
15. Rank jumps and growth of Shafarevich–Tate groups for elliptic curves in $\mathbb{Z}/p\mathbb{Z}$ -extensions (with L. Beneish and A. Ray)
pre-print available on arXiv, submitted
16. Growth of p -parts of ideal class groups and fine Selmer groups in \mathbb{Z}_q -extensions with $p \neq q$ (with A. Lei)
preprint available upon request, submitted
17. Arithmetic Statistics and Non-Commutative Iwasawa Theory (with A. Lei and A. Ray)
pre-print available on arXiv, submitted

FELLOWSHIPS

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| INSPIRE Fellowship <i>Department of Science and Technology, Government of India</i> | 2010–2015 |
| JNCASR Summer Fellowship <i>JNCASR, India</i> | 2012 |
| DAAD WISE Scholarship <i>Germany</i> | 2013 |
| IAS Summer Fellowship (not availed) <i>Indian Academy of Sciences, India</i> | 2013 |
| MITACS Globalink Research Internship <i>Canada</i> | 2014 |

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| Rhodes Scholarship finalist (top 18) <i>Oxford University, UK</i> | Class of 2015 |
| TIFR VSRP Fellowship <i>TIFR, India</i> | 2015 |
| BIGS Scholarship for Graduate Studies (not availed) <i>Hausdorff Center for Mathematics, Bonn, Germany</i> | 2015–2018 |
| MITACS Graduate Fellowship <i>Canada</i> | 2015–2018 |
| Vivekananda Graduate Award for International Students <i>University of Toronto</i> | 2018–2019 |
| General Motors Women in Mathematics and Science Award <i>University of Toronto</i> | 2019–2020 |
| Malcolm Slingsby Robertson Prize in Mathematics <i>University of Toronto (best thesis award)</i> | 2020 |
| CRM-ISM Postdoctoral Fellowship <i>Université de Montréal</i> | Fall 2020 |
| PIMS Postdoctoral Fellowship <i>University of British Columbia, Vancouver</i> | January 2021– December 2022 |

SEMINARS

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| Introduction to Game Theory <i>Mathematics Club, IISER Mohali</i> | Aug 2012 |
| 27 Lines on a Cubic <i>Department Colloquium, IISER Mohali</i> | Nov 2013 |
| Proofs of Quadratic Reciprocity <i>Department Colloquium, IISER Mohali</i> | April 2014 |
| Linear Groups- Malcev's Theorem and Selberg's Lemma <i>IISER Mohali</i> | April 2014 |
| Principal L-Functions of the Linear Group <i>Department of Math, University of Toronto</i> | August 2016 |
| Understanding the Rank Distribution Conjecture <i>Graduate Seminar, Department of Math, University of Toronto</i> | Nov 2016 |
| What is an Elliptic Curve? <i>Graduate Seminar, Department of Math, University of Toronto</i> | April 2017 |
| Fun with Tilings <i>Graduate Seminar, Department of Math, University of Toronto</i> | Fall 2018 |
| Möbius Functions and Number Theory <i>Math Camp, Department of Math, University of Toronto</i> | Summer 2019 |
| Pigeonhole Principle and its Applications <i>Graduate Seminar, Department of Math, University of Toronto</i> | January 2020 |
| Iwasawa Theory and Pseudo-nullity Conjectures <i>Invited talk, Algebra & Number Theory Seminar, University of Laval</i> | January 2020 |
| Iwasawa Theory of Fine Selmer Groups <i>Invited talk, QVNTS, Montreal</i> | January 2020 |
| Overview of Iwasawa Theory <i>Invited talk, Junior Number Theory Seminar, University of Toronto</i> | October 2020 |
| Iwasawa Theory of Fine Selmer Groups <i>Invited talk, Fields Institute Number Theory Seminar video</i> | November 2020 |

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| Iwasawa Theory of Fine Selmer Groups <i>Invited talk, PIMS Online Colloquium</i> | February 2021 |
| Iwasawa Theory of Fine Selmer Groups <i>Invited talk, Number Theory Seminar, University of Toronto</i> | March 2021 |
| Iwasawa Theory <i>Invited lecture series (3 lectures), Seoul National University</i> | Summer 2021 |
| Iwasawa Theory and Arithmetic Statistics <i>Invited talk, University of Göttingen</i> | June 2021 |
| Iwasawa Theory and Arithmetic Statistics <i>Invited talk, Ohio State University</i> | October 2021 |
| Iwasawa Theory and Arithmetic Statistics <i>Invited talk, Université de Montréal</i> | November 2021 |
| Iwasawa Theory and Arithmetic Statistics <i>Invited talk, IISER Mohali Online Colloquium</i> | November 2021 |

CONFERENCES, WORKSHOPS AND SUMMER SCHOOLS

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| GANITA Conference, The Fields Institute <i>participant</i> | June 2016 |
| Summer Graduate School, MSRI <i>Summer school on Introduction to Character Theory and the McKay Conjecture.</i> | July 2016 |
| PIMS Summer School, UBC Vancouver <i>Summer School on Representation Theory of Finite Groups</i> | July 2016 |
| Fields Medal Symposium, The Fields Institute <i>participant</i> | Nov 2016 |
| Montreal-Toronto Workshop in Number Theory, CRM <i>Workshop on Mock Modular Forms</i> | Dec 2016 |
| 5 Day Workshops at BIRS, Banff <i>Workshop on Diophantine Approximation and Algebraic Curves</i> | July 2017 |
| Summer Graduate School, MSRI <i>Summer school on Automorphic Forms and Langlands Program</i> | July 2017 |
| AIM Workshop, San Jose <i>Workshop on Functoriality and the Trace Formula</i> | Dec 2017 |
| Montreal-Toronto Workshop in Number Theory, CRM <i>Workshop on Unitary Shimura Varieties</i> | January 2018 |
| Arizona Winter School, Tucson <i>Winter school on Iwasawa Theory</i> | March 2018 |
| PIMS Focus Period, UBC Vancouver <i>Focus Period on Representations in Arithmetic</i> | March 2018 |
| Upstate Number Theory Conference, SUNY Buffalo <i>Young Researchers Conference</i> | April 2018 |
| Strength in Numbers, Queen's University <i>Graduate Student Conference, Contributed talk</i> | May 2018 |
| CTNT Summer School, University of Connecticut <i>Summer School and Conference</i> | May 2018 |
| CNTA Conference, Université Laval <i>Contributed talk</i> | July 2018 |
| Montreal-Toronto Workshop in Number Theory, CRM <i>Workshop on p-adic Hodge Theory</i> | March 2019 |
| John H. Barrett Memorial Lectures, University of Tennessee <i>participant</i> | May 2019 |

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| Analytic & Combinatorial Number Theory, UIUC <i>Contributed talk</i> | June 2019 |
| SOGMSC, University of Guelph <i>Contributed talk</i> | June 2019 |
| Boston University-Keio University Workshop <i>Contributed talk</i> | June 2019 |
| Palmetto Number Theory Seminar (PANTS) XXXII <i>Invited talk</i> | Sep 2019 |
| Maine-Quebec Number Theory Conference <i>Contributed talk</i> | October 2019 |
| MAAIM, Emory University <i>Contributed talk</i> | Nov 2019 |
| CMS Mini-Course on Iwasawa Theory <i>Co-organizer with R. Sujatha</i> | Dec 2019 |
| CTNT Conference, University of Connecticut <i>Contributed talk slides</i> | June 2020 |
| Maine-Quebec Number Theory Conference <i>Contributed talk slides video</i> | Fall 2020 |
| John's Hopkins Junior Number Theory Days <i>Invited Talk notes video</i> | Dec 2020 |
| AIM Workshop, Online <i>Workshop on Arithmetic Intersection Theory on Shimura Varieties</i> | Jan 2021 |
| Spring School towards a mod-p Langlands correspondence <i>participant</i> | April 2021 |
| CMS Summer Meeting <i>Invited talk (Statistics of Iwasawa Invariants), Session: Algebraic Number Theory</i> | June 2021 |
| Workshop on Arithmetic Statistics Problems <i>Invitation-only Conference</i> | July 2021 |
| Maine-Quebec Number Theory Conference <i>Contributed talk</i> | October 2021 |

LEARNING SEMINARS ORGANIZED/ PARTICIPATED

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| Summer Learning Seminar on Modular Forms <i>Graduate Seminar, Department of Math, University of Toronto</i> | Summer 2017 |
| Summer Learning Seminar on Galois Cohomology <i>Graduate Seminar, Department of Math, University of Toronto</i> | Summer 2017 |
| Introduction to Automorphic Forms and Langlands Program <i>Graduate Seminar, Department of Math, University of Toronto</i> | Fall 2017 |
| Learning Seminar on Classical Iwasawa Theory <i>Graduate Seminar, Department of Math, University of Toronto</i> | Fall 2017 |
| Learning Seminar on Beyond Endoscopy <i>Graduate Seminar, Department of Math, University of Toronto</i> | 2017–18 |
| Learning Seminar on Etale Cohomology <i>Graduate Seminar, Department of Math, University of Toronto</i> | Winter 2018 |
| Learning Seminar on Complex Multiplication <i>Graduate Seminar, Department of Math, University of Toronto</i> | Fall 2018 |
| Learning Seminar on p-adic Lie Groups <i>Graduate Seminar, Department of Math, University of Toronto</i> | Summer 2019 |
| Learning Seminar on Tate Conjectures <i>Graduate Seminar, Department of Math, University of Toronto</i> | Fall 2019 |

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| Learning Seminar on Abelian ℓ-Adic Representations <i>Graduate Seminar, Department of Math, University of Toronto</i> | Summer 2020 |
| Learning Seminar on Euler system and Eisenstein congruences <i>Iwasawa Seminar, Department of Math, UBC Vancouver</i> | Fall 2020 |
| CRM Women's Seminar <i>Part of the thematic program at CRM</i> | Fall 2020 |
| Learning Seminar on Coleman Families of Modular Forms <i>Part of the thematic program at CRM</i> | Fall 2020 |
| Learning Seminar on Eigenvarieties <i>Iwasawa Seminar, Department of Math, UBC Vancouver notes</i> | Winter 2021 |
| Learning Seminar on Quadratic Twists <i>Iwasawa Seminar, online</i> | Winter 2021 |
| UBC Number Theory Seminar <i>Department of Mathematics, UBC Vancouver</i> | 2021-present |

TEACHING ASSISTANCE EXPERIENCE (UNIVERSITY OF TORONTO)

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| MAT223 (Linear Algebra) <i>Instructor: Mr. Sean Uppal</i> | Fall/Winter 2015–16 |
| MAT235 (Multivariable Calculus) <i>Instructor: Dr. Nara Jung</i> | Fall/Winter 2018–19 |
| MAT237 (Multivariable Calculus) <i>Instructor: Dr. Tyler Holden, Prof. Robert Gerrard</i> | Summer 2016, Fall/Winter 2018–19 |
| MAT240 (Linear Algebra for Math Specialists) <i>Instructor: Prof. Eckhard Meinrenken</i> | Fall 2016; Fall 2017 |
| MAT246 (Concepts in Abstract Math) <i>Instructor: Dr. J Korman, Dr. H Soheil, Prof. F Murnaghan, Dr. D. Burbulla</i> | Multiple |
| MAT247 (Linear Algebra II for Math Specialists) <i>Instructor: Prof. Stephen Kudla</i> | Winter 2018 |
| MAT315 (Elementary Number Theory) <i>Instructor: Prof. Henry Kim</i> | Winter 2020 |
| MAT336 (Elements of Analysis) <i>Instructor: Dr. H Soheil</i> | Winter 2017 |
| MAT401 (Polynomial Equations and Fields) <i>Instructor: Dr. Jonathan Korman</i> | Summer 2017 |

TEACHING EXPERIENCE

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| University of Toronto: | |
| MAT188 (Linear Algebra) <i>Course Coordinator: Dr. Dietrich Burbulla</i> | Fall 2018 |
| MAT136 (Calculus II) <i>Course Coordinator: Dr. Sarah Mayes-Tang</i> | Winter 2019 |
| MAT136 (Calculus II) <i>Course Coordinator along with Daniel Le and Abhishek Oswal</i> | Summer 2019 |

MAT237 (Multivariable Calculus) Summer 2020
Course Coordinator along with Travis Ens, Armanpreet Pannu, and Ren Zhu
University of British Columbia (Vancouver):
MAT105 (Integral Calculus for Social Sciences and Commerce) Winter 2021
Course Coordinator: Keqin Liu

ACADEMIC SERVICES

Refereed for Annales Mathématiques du Québec, Canadian Math Bulletin,
Czechoslovak Mathematical Journal, Mathematika
Reviewer for Mathematics Reviews

MENTORSHIP

Math Outreach, UofT 2018–2020
I was a mentor for the high school mentor-ship program. I mentored Anna Krokhine for her research project on graph theory and combinatorics in 2018. In 2019, I mentored Maya Bozzo-Rey on her project on Benford's Law. In 2020, my student, Jennifer Wang explored questions from number theory.

Undergraduate Mentorship 2021–present
I have been supervising Adithya Chakravarty (student at University of Toronto) for his Bachelor's (research) thesis on Iwasawa theory. Starting Jan 2022, I will be supervising Vitthal Yelambase (student at BITS Goa, India) for his Bachelor's project.

OTHER SERVICES

Outreach Committee, IISER Mohali 2013–2015
I was a student volunteer of the institute Outreach Committee and had made several presentations. Our main focus was to introduce topics of current scientific research to school teachers (of the Punjab Government school system) and bring out the connection between learning science and doing science. We also organized the Annual Science Day for school students in the tri-city area (Chandigarh-Panchkula-Mohali).

MGSA, UofT 2016–2020
I was an active member of the Mathematics Graduate Students' Association. For several years, I was a Graduate Planning Committee representative. In addition, for the academic year 2018-19, I was appointed the treasurer.

Women in Math, Toronto Chapter 2019–2020
Female graduate students from schools in and around the Greater Toronto Area came together for WiM, Toronto Chapter in 2019. I was a part of the core team and a mentor for incoming graduate students.

Outreach, UBC 2021–present
I was an adjudicator for MURC 2021. This is an undergraduate level multi-disciplinary research conference organized at UBC every year.

Panelist at MathPath July 2021
I was a panelist at the MathPath Summer Camp for middle school students talking about hardships faced as a female mathematician.

EDI Committee, UBC 2021-present
I am a member of the Math Department Equity, Diversity and Inclusion Committee at UBC, Vancouver.

SKILLS

Languages Bengali (mother tongue)
 English (fluent)
 Hindi (fluent)

Software L^AT_EX

REFERENCES

Available upon request.