Vishal Yadav

Curriculam Vitae

22, Curtis Place, St. John's, NL, A1B 3G8, Canada

✆ *(+1)226 881 2605*

✉ *vkyadav@mun.ca*

Education

2022-	**Doctor of Philosophy**, *Memorial University of Newfoundland and Labrador*, St. John's - Canada, *Mathematics, Research Topic: Lie and Hopf Algebras*.
2014–2019	**Integrated BS-MS**, *Indian Institute of Science Education and Research*, Thiruvananthapuram - India, *Mathematics, CGPA 7.21/10*.
2011–2013	**Higher Secondary Education**, *Lakshman Bal Vidya Mandir Inter College*, Faizabad-India, *Mathematics, Percentage 84.6/100*.

Scholarships and Achievements

2021	Secured an All India rank of 67 in *GATE* examination held in Feb 2021.
2020	Secured an All India rank of 115 in *UGC-CSIR(JRF)* examination held in Sept 2020.
2014–2019	Innovation in Science Pursuit for Inspired Research (INSPIRE) scholarship granted by Department of Science and Technology (DST) for all 5 years of undergraduate and graduate study.
2018	Winner of Battle of Bands competition at Inter IISER Cultural Meet(IICM), Kolkata.
2018	Secured an All India rank of 92 in CSIR-NET held in June 2018.
2014	Qualified IIT-JEE examination held in May-2014 conducted by Joint Admission Board(JAB) once in a year.

Teaching Experience, Job and Volunteer Work

Job	Jan 2022: Held a position of Guest Faculty in Department of Mathematics, *Deen Dayal Upadhyaya College* for teaching the courses '*Mathematical Finance and Real Analysis*'to 3rd and 2nd year undergraduate students respectively.
	Jan 2021: Held a position of Guest Faculty in the Department of Mathematics, *University of Delhi* for teaching the course '*Advanced group theory*' to final year M.A./M.Sc. students.
	Jan 2020: Held a position of Guest Faculty in the Department of Mathematics, *University of Delhi* for teaching the course '*Advanced group theory*' to final year M.A./M.Sc. students.
Volunteer	Volunteered for the *International Conference on Number Theory* (ICNT) held in IISER-Thiruvananthapuram from 11 to 13 March, 2019 as part of Institute's decennial celebrations.
	Volunteered as a Mathematics tutor in *Saraswati Seva Foundation*, a non-profit organization with a vision to encourage social justice by empowering women and serve the under-privileged communities using knowledge tools, where I had taught mathematics to under-privileged High school students.

▬▬▬ Research Experience

Aug 2018 – April 2019
Major Project (5th Year), *Thesis Title: Introduction to Sieve Theory and its Applications*, Indian Institute of Science Education and Research, Thiruvananthapuram, Supervisor: Dr. Srilakshmi Krishnamoorthy.

In the following project, I studied a few important techniques of Sieve theory. I started with studying Sieve of Eratosthenes-Legendre, then moving on to Selberg's lambda-squared method, and then the method of Large Sieve. Apart from these technique's, I covered a variety of topics like sifting of an arithmetic progression, bounds on the number of twin primes in a given interval (which gives, as a corollary, the famous result that the sum of reciprocals of Twin Primes converges), Ramanujan sums, and weighted sums of Dirichlet characters. Next, I studied the well-known result of Barban-Davenport-Halberstam on the error term of Prime Number Theorem for primes in arithmetic progression, which gives a bound on the second Chebyshev function. Lastly, I read the proof of the Bombieri-Vinogradov theorem, which concerns itself with the bound on Prime counting function, as an application of the Large Sieve method. Along with the standard results, I have also gone through a research paper published by Moni Kumari and Ram Murty titled 'Simultaneous non-vanishing and sign changes of Fourier coefficients of modular forms'. I have followed the book 'An Introduction to Sieve Methods and Their Applications' by A. C. Cojocaru and M. Ram Murty.

Summer 2018
Summer Internship, *Title: Theory of Elliptic Curves and Modular Forms*, Indian Institute of Technology, Kanpur, Supervisor: Dr. Somnath Jha.

This was a reading project in the theory of Elliptic curves and Modular forms. I started this project by studying a proof of Dirichlet's theorem on arithmetic progression. Then, I read the basics of Elliptic curves. I have covered the following topics: Congruent numbers, Doubly periodic functions, and Elliptic curves in Weierstrass form. I also learned how to define addition law on an Elliptic curve and about the Congruent Number problem. Apart from this, I read about some basic results in Modular Forms. The books that I followed during my internship are 'Elliptic Curves: Number Theory and Cryptography' by L. C. Washington, 'Course in Arithmetic' by J. P. Serre, and 'Introduction to Elliptic curves and Modular forms' by Neal Koblitz.

Jan-Apr 2018
Minor Project (8th Semester), *Title: Von Neumann's Theorem and Extension of Symmetric Operators*, Indian Institute of Science Education and Research, Thiruvananthapuram, Supervisor: Dr. Sreedhar Dutta.

This was a project in physics on 'Von Neumann's theorem and extension of symmetric operators' to obtain a Minor degree in Physics. Jon Von Neumann using his theory of deficiency indices answers two important questions concerning the Theory of Linear operators in Hilbert Space. First, when do Symmetric operators have Self-Adjoint extensions? Second, if they do, how can these extensions be characterized? This project was aimed at understanding his theory and the answers to these questions. In order to fully grasp the underlying ideas, I applied his theory to Hilbert's space of all complex-valued square-integrable functions, and evaluated its self-adjoint extension. Followed the book 'Theory of Linear Operators in Hilbert spaces' by N. I. Akhiezer, I. M. Glazman.

Dec 2017
Winter Internship, Indian Institute of Technology, Kanpur, Supervisor: Dr. Somnath Jha.

This was a reading project in Analytic Number Theory aimed at understanding the proof of two fundamental theorems in Analytic number theory: Dirichlet's Theorem on Primes in Arithmetic Progression and Prime Number Theorem. Followed the book 'Introduction to Analytic Number Theory' by Tom M. Apostol.

Summer 2017	**Summer Internship**, Indian Statistical Institute, Bangalore, Supervisor: Dr. B. Sury.

This was a reading project in Number Theory aimed at understanding the basics of Analytic number theory. The topics covered are as follows: Dirichlet multiplication, Average of arithmetical functions, and Distribution of primes-some elementary estimates. Followed the book 'Introduction to Analytic Number Theory' by Tom M. Apostol.

Summer 2016	**Summer Internship,**, *Project Title: Metric Spaces*, Indian Institute of Science, Bangalore, Supervisor: Dr. S Thangavelu.

This was a reading project directed at understanding metric spaces and proving the compactness of the set of continuous functions on a closed and bounded interval of real numbers.

Fall 2015	**Summer Internship**, *Project Title: Introductory Analysis*, Indian Institute of Science Education and Research, Thiruvananthapuram, Supervisor: Dr. Sheetal Dharmatti.

In this reading project, I studied the construction of real numbers using the Peano axioms. Following this, I read about limit of sequences, continuous functions on real numbers, infinite series, and convergence tests. Followed the book Analysis-I by Terence Tao.

Talks

2019	Talk at IISER-TVM discussing my major project titled 'Introduction to Sieve Theory and its Applications'.
2018	Talk at IISER-TVM discussing my minor project titled 'Von Neumann's Theorem and Extension of Symmetric Operators'.
2018	Talk titled 'Dirichlet's Theorem on Prime Progression' at the Anvesha science exhibition in IISER-TVM.
2017	Talk titled 'Prime number theorem' at the Anvesha science exhibition in IISER-TVM.

Conference Attended

2021	International e-Conference on Number Theory and Differential Equations (ICND), Central University of Karnataka, Kalaburagi, Dec 20- Dec 24, 2021.
2019	International Conference on Number Theory (ICNT), Indian Institute of Science Education and Research, Thiruvananthapuram, March 11- March 13, 2019.
2017	Madhava Mathematics Camp, Indian Statistical Institute, Bangalore, June 5-June 9, 2017.
2016	Annual Foundation School, IISER-Thiruvananthapuram, Dec 5- Dec 31.

Coursework

Mathematics	**5th Year**, Complex Dynamics.

4th Year, Differential Geometry, Probability Theory and Stochastic Process, Fourier Analysis, Hyperbolic Geometry, Programming and Data Structures, Rings Modules and Algebra, Elliptic curves and Modular Forms, Functional Analysis, Analysis on Manifolds, and Partial Differential Equations.

3rd Year, Real Analysis, Abstract Algebra, Linear Algebra, Numerical Analysis, Number Theory and Cryptography, Complex Analysis, Measure Theory and Integration, Galois Theory and Commutative Algebra, Theory of Ordinary Differential Equations, and General Topology.

1st and 2nd Year, Introduction to Algebra, Introductory Analysis, Multivariable Calculus, and Introduction to Probability and Statistics.

Other Courses	**Physics:** Mechanics-I, Electrodynamics-I, Optics, Thermal and Statistical Physics, Quantum Mechanics-I, Electronics-II, and Experimental Methods.
	Chemistry: Atomic Structure and Chemical Bonding, Chemistry of Elements, Chemical Reactions and Reactive Intermediates, and Principles of Physical Chemistry.
	Biology: Introductory Biology, Introductory Physiology, Ecology Evolution and Behaviour, and Genetics and Molecular Biology.
	Others: Functional English, Mathematical Tools, Introduction to Economics, Biochemistry, Principles and Applications of Spectroscopy, and Philosophy of Science.

Technical Skills

Programming	Python, C
Software	LaTeX, Microsoft Office, MATLAB, Mathematica

Interests

Playing Drums, Trekking, Poetry, Cycling, Solving Sudoku