

# Harsh Kumar

Junior Undergraduate

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CONTACT INFORMATION	Dept. of Mathematics and Scientific Computing Indian Institute of Technology, Kanpur Room F-369, Hall 2, IIT Kanpur Kanpur - 208016, India	<i>mobile:</i> +91-9807443785 <i>e-mail:</i> <a href="mailto:harshkmr@iitk.ac.in">harshkmr@iitk.ac.in</a>
EDUCATION	<b>Indian Institute of Technology Kanpur</b> , Kanpur, India	
	<i>B.S. in Mathematics and Scientific computing</i>	<b>2012-present</b>
	- <b>Cumulative Performance Index (CPI) 8.3 on a scale of 10</b> (after 5 semesters)	
	<b>St. Paul's Sr. Sec. School, Jodhpur, Rajasthan</b> , India	
	<i>Senior School Certificate Examination (CBSE)</i>	<b>2012</b>
	- Scored 93.8% marks in XII AISSCE, March 2012	
	<i>Secondary School Certificate Examination (CBSE)</i>	<b>2010</b>
	- Scored Cumulative Grade Point Average (CGPA) 9.4 on the scale of 10 in X AISSE, March 2010	
ACADEMIC ACHIEVEMENTS	<ul style="list-style-type: none"><li>• <b>All India Rank 3930</b> in <b>IIT Joint Entrance Examination 2011</b>, out of around 500,000</li><li>• Qualified for participation in the <b>Indian National Mathematical Olympiad 2011</b> through the <b>Regional Mathematics Olympiad 2011</b>, Rajasthan Region</li><li>• Awarded the joint <b>Summer Research Fellowship, 2014</b> by the Indian Academy of Sciences (IAS), the Indian National Science Academy (INSA) and the National Academy of Sciences, India (NASI) for doing project work in the summer</li><li>• Stood 3<sup>rd</sup> in <b>National Map Quiz, 2010</b> organized by the Indian National Cartographic Association</li></ul>	
RESEARCH EXPERIENCE	<b>Number of real roots of a system of polynomial equations</b> <b>Summer 2014</b> <i>Supervised by Prof. Jugal K. Verma</i> <i>Summer Research project, IIT Bombay</i>	
	<ul style="list-style-type: none"><li>• This was a 2 month reading project in algebra funded by the Summer Research Fellowship awarded by the Indian Academy of Sciences</li><li>• The aim of the project was to study a method to compute the number of real roots of a set of polynomial equations given by P. Pederson, M. F. Roy and A. Szpirglas in 1994 and implement it in Singular</li><li>• This involved the study of Hilbert's Nullstellensatz, Gröbner Basis, Sylvester's Inertia Theorem, Bernstein's Theorem for Binomials</li><li>• This included the study of the paper establishing the theorem</li></ul>	
	<b>Fourier Analysis on Finite Abelian Groups and the Dirichlet's</b> <b>August 2014-November 2014</b> <b>Theorem</b> <i>Supervised by Prof. Shobha Madan</i> <i>Undergraduate Research Project, IIT Kanpur</i>	
	<ul style="list-style-type: none"><li>• Semester project as a course (MTH 391A) in the 2013-14/1<sup>st</sup> Semester on finite fourier analysis and its applications to number theory</li><li>• This involved reading parts of Stein and Shakarchi's <i>Fourier Analysis: an Introduction</i> pertaining to Finite Abelian Groups, culminating in the proof of Dirichlet's theorem on the infinitude of primes in arithmetic progressions</li></ul>	

# Norm Convergence of Multiple Fourier Series

January 2015-April 2015

Supervised by Prof. Shobha Madan

Undergraduate Research Project, IIT Kanpur

- Semester project as a course (MTH 392A) in the 2013-14/2<sup>nd</sup> Semester on norm convergence of polygonal and spherical summation of multiple fourier series
- This involved reading up on norm convergence of single variable fourier series, the Hilbert transform of one variable and its relationship to norm convergence of polygonal summation of multiple fourier series.
- This also involved the study of the Kakeya set constructions by Besicovitch and Cunningham and their use in the study of norm convergence of spherical summation of multiple fourier series.

## TECHNICAL SKILLS

- *Languages:* C, Python, Haskell
- *Software/Libraries:* Matlab, GNU Octave, Singular
- *Tools:* L<sup>A</sup>T<sub>E</sub>X, HTML5

## RELEVANT COURSES

- Real Analysis, Abstract Algebra, Mathematical Logic, Ordinary Differential equations, Probability and Statistics, Universal Algebra, Linear Algebra, differential equation, Complex Analysis, Multivariable Analysis and Differential Geometry and Algebra II (Field and Galois Theory)
- Introduction to Programming and Algorithms and Data Structures
- *Presently doing:* Partial Differential equations, Analysis 2(Integration and Measure theory), Principles of Numerical Analysis and Graph Theory
- *Next semester:* Functional Analysis, Theory of Computation, Fourier analysis and Algebraic Topology

## POSITIONS OF RESPONSIBILITY

- **Academic Mentor (2012-2013)**, Counselling Service, IIT Kanpur, Provided academic assistance, along with taking extra-lectures for students struggling with academics
- **Institute Student Guide**, Counselling Service, IIT Kanpur, Mentoring 6 freshmen to guide them for a smooth transition into campus life in both academic and extracurricular spheres
- **Quiz Club Secretary**  
Worked for promotion of quizzing activities in the institute. Organized various quizzes, including *National General Quiz* at Antaragni 2012

## REFERENCES

**Dr. Shobha Madan**

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**Dr. Jugal K. Verma**

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