

MATHNEWS

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An e-Newsletter from the Department of Mathematics, CUTN

Editors: Dr. T. Kavaskar and Dr. S. V. Bharanedhar

Vision

To be an internationally acclaimed Department of Mathematics for its teaching and research that also caters to the educational and occupational needs of the local community.

Mission

To provide a world class teaching and research infrastructure.

To promote professional working environment that supports innovative thinking and teamwork.

To inculcate the art of asking questions, formulating the problem, solving the problem and interpreting the solution for possible applications.

About the Department

This department was started in the year 2010 with five-year integrated M.Sc., Programme in Mathematics and of which, four batches have passed out. Department of Mathematics strives to be a premier educational and research facility in India focusing on innovative teaching, abstraction, application and interdisciplinary research in Mathematics. The department promotes professional working environment that supports risk taking, innovative ideas and team work. At present we have 9 regular faculty members against the 10 sanctioned positions. We offer five-year integrated Masters programme in Mathematics, M. Phil in Mathematics and PhD program in Mathematics. The curriculum for I. M. Sc. programme was designed in consultation with top Mathematicians of this country that includes essential abstract and applied topics of Mathematics. We prescribe project work for I. M. Sc. students for motivating them to do research in Mathematics. The first batch of PhD students joined the department in August 2015.

The thrust areas of research in our department include Functional Analysis, Numerical Analysis, Algebra, Linear Algebra, Optimization and Operations Research, Data Mining & Analytics, Computational/Numerical Algorithms, Partial Differential Equations, Integral Equations, Harmonic Analysis, Integral Transforms, Fluid Dynamics, Graph Theory, Complex Analysis and Topology.

Faculty Members and their areas of interest

	<p>DR. V. RENUKA DEVI Associate Professor and Head General Topology - Ideal topological space, Volterra space, statistical convergence; Generalized topological space, Soft sets.</p>		<p>PROF. T. SENGADIR Professor and Dean Functional Analysis, PDE and PDE with delays.</p>
	<p>DR. R. ROOPKUMAR Professor Integral Transforms and Generalized functions.</p>		<p>DR. A. CHANDRASHEKARAN Assistant Professor Linear Algebra, Game Theory and Linear Complementarity problems.</p>
	<p>DR. RAMESH VENKADACHALAM PALANI Assistant Professor Algorithms & Complexity theory, Number Theory, Big Data Analytics and Pedagogy.</p>		<p>DR. N. BARANI BALAN Assistant Professor Inverse Problems, Optimal Control and Partial Differential Equations.</p>
	<p>DR. VIRENDRA KUMAR Assistant Professor Fluid Mechanics, Flow through Porous Media, Bio-convection and Perturbation Techniques.</p>		<p>DR. T. KAVASKAR Assistant Professor Graph Theory and Algebraic Combinatorics.</p>
	<p>DR. S. V. BHARANEDHAR Assistant Professor Harmonic mappings, Graph Theory and Complex Analysis.</p>		

Achievements and Invited talks/presentations by faculty members

The following are the talks/presentations delivered by Dr. R. Roopkumar

1. Delivered a talk on “Challenges of Teaching Mathematical Analysis”, Faculty development programme in Ayya Nadar Janaki Ammal College, Sivakasi on 23-09-2021 (Online).
2. Delivered the lectures on “Complex Integration”, 35th refresher course in Mathematics and statistics in RIASM, University of Madras for two days 28-10-2021 and 29-10-2021. (Online)
3. Delivered a talk on “Use of Integral Transforms in Image Processing”, One day National Conference on Recent trends in Mathematics Modeling and its applications (NCRTMMA – 2022) at Sudharsan College of arts and Science, Pudukkottai on 20-04-2022 (Online)
4. Delivered a talk on “Extensions of Fourier Transform”, National Conference on Present Scenario in Mathematical Research (PSMR-2022) at Mannar Thirumalai Naicker College, Madurai on 22-04-2022.

The following are the talks/presentations delivered by Dr. V. Renuka Devi

1. Delivered a talk on “Fixed Point Theorem and its application”, V.V. Vanniaperumal College for Women, Virudhunagar on 26-08-2021 (Online).
2. Delivered a talk on “Non Euclidean Geometry”, Govt. Arts College, Kumbakonam on 22-12-2021.
3. Delivered a talk on “Algebraic Topology”, Ayya Nadar Janaki Ammal College, Sivakasi on 30-12-2021 (Online).
4. Delivered a talk on “Fuzzy Optimization Modelling”, International Conference on Recent Trends in Applied Mathematics, Loyola College, Chennai on March 3 &4, 2022.

The following are the talks/presentations delivered by Dr. A. Chandrashekar

1. Delivered a talk on “National Level Workshop on Enriching Problem Solving Skills in Pure and Applied Mathematics”, Mepco Schlenk Engineering College, Sivakasi on 03-09-2021.
2. Delivered a talk on Functional Analysis, Mepco Schlenk Engineering College, Sivakasi on 02-09-2021 and 08-09-2021.
3. Delivered a series of lectures related to “Foundation course in Mathematics”, MTTS programme during 19-09-2021 to 11-10-2021.
4. Delivered expert lecture on “Mathematical Optimization and Applications”, IIT Indore from 22nd – 27th March 2021.
5. Delivered a series of lectures in the MTTS programme, IISER Thiruvananthapuram during 23-05-2022 to 18-06-2022.

The following are the talks/presentations delivered by Dr. V. P. Ramesh

1. Delivered a series of lectures at the Winter School in Mathematics related to “Topics in linear algebra”, ISI Tezpur from 17th- 22th January, 2022.

The following are the talks/presentations delivered by Dr. N. Barani Balan

1. Delivered a talk on “Basic Analysis” at the DBT- Star college six days National Level webinar cum workshop on Calculus, Algebra and Analysis, Rathnavel Subramaniam College of Arts and Science, Coimbatore from 07-07-2021 to 13-07-2021.
2. Delivered a talk on “Essence of Optimal Control and Inverse Problems in Biological Models” at the virtual conference conducted by the Department of Mathematics, School of Physical Science, Central University of Karnataka from 20-12-2021 to 24-12-2021.

The following are the talks/presentations delivered by Dr. T. Kavaskar

1. Delivered an invited talk on “Course Module – Importance of Teaching Skills” held in Government Arts and Science College, Jayankondam on 05-05-2022.
2. Delivered a talk in State level Seminar on “Some Application of Graph Theory and Number Theory “ on 11-05-2022 at Dharamapuram Gnanambigai Government Art college, Mayiladuthurai.

The following are the talks/presentations delivered by Dr. S. V. Bharanedhar

1. Delivered two talks on “Analytic functions and Complex integration “ in the online workshop on Mathematical Analysis (MATANA-2021), at Loyola college from 13 – 18, September 2021.

Publications

Title of paper	Name of the author/s	Name of the journal	Year of publication
Two-dimensional Fractional Stockwell Transform	R. Kamalakkannan and R. Roopkumar	Circuits, Systems, and Signal Processing	2021
One-dimensional Quaternionic special Affine Fourier Transform	R. Roopkumar	Advances in Applied Clifford Algebras	2021
Statistical Convergence of Double Sequences	V. Renuka Devi and P. Vijayashanthi	Jordan Journal of Mathematics and statistics	2021
A new a priori estimation for singularity perturbed problems with discontinuous data	V. P. Ramesh, S. Janakiraman, M. Prithvi and G. Narayani	Indian J. Pure Appl. Math.	2022
Generalized Lambert-type transforms over integrable Boehmians	E. R. Negrin and R. Roopkumar	Integral Transforms and Special Functions	2022
A note on cubic residues modulo n	V. P. Ramesh, R. Gowtham and Saswti Sinha	Indian J. Pure Appl. Math.	2022

A robust numerical algorithm on harmonic mesh for parabolic singularly perturbed convection-diffusion problems with time delay	Gajendra Babu, M. Prithvi, Kapil K. Sharma, and V.P. Ramesh	Numerical Algorithms	2022
Beck's Coloring of Finite Product of Commutative Ring with Unity	T. Kavaskar	Graphs and Combinatorics	2022
Approximation of nonlinear infinite delay equations in Banach spaces by finite delay equations	G. Divyabharathi and T. Sengadir	Proc. Indian Acad. Sci.	2022
Generalized convergence and generalized sequential spaces	V. Renuka Devi and P. Vijayashanthi	Creat. Math. Inform.	2022
A Prime Primitive Root p of $2p+1$ is a Sophie Germain Prime	V. P. Ramesh, Kapil K. Sharma, B. Priyanga and G. Narayani	The American Mathematical Monthly	2022
Inverse problem for a Cahn–Hilliard type system modelling tumor growth	K. Sakthivel, A. Arivazhagan, N. Barani Balan	Applicable Analysis	2022

Book Chapter

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Name of the conference	National / International	Year of publication
1	Virendra Kumar	Applied Analysis, Computation and Mathematical Modelling in Engineering	Non-darcian Gravitatic Bioconvection with a Porous saturated Vertical Vibration	AACMME: International Conference on Applied Analysis, Computation and Mathematical Modelling in Engineering	International	2022
2	Virendra Kumar	Advanced Information Networking and Applications	Multi-agent Q-learning Based Navigation in an Unknown Environment	Proceedings of 36 th International Conference on Advanced Information Networking and Applications (AINA-2022), Volume 1	International	2022

Research projects

Name of the Scheme/Project/Endowments/ Chairs	Name of the Principal Investigator/ Co Investigator (if applicable)	Name of the Funding agency	Year of Award	Funds provided (INR in lakhs)	Duration of the project
Linear complementarity Problems over the cone of Completely Positive matrices	Dr. A. Chandrashekar	SERB – ECR	2018	21.2256	2018-2021
Coloring Problems on Zero-divisor graphs	Dr. T. Kavaskar	UGC-BSR Start-up grant	2019	10	2019-2022
A Study on proper Cones with applications to Mathematical Programming	Dr. A. Chandrashekar	SERB	2020	6.6	2020-2023

Research Collaborations

Sl. No.	Name and address of the collaborators	Name of the faculty	Duration
1	Prof. A. Zayed, DePaul University, Chicago, USA	Dr. R. Roopkumar	Sep 01,2019 – till date
2	Prof. E.R. Negrin, Universidad de La Laguna, Canary Islands, Spain.	Dr. R. Roopkumar	Apr 26, 2020- till date
3	Prof. Thangadurai, Harish-Chandra research Institute, Allahabad	Dr. V. P. Ramesh	Dec. 17, 2012 – till now
4	Prof. Kapil Sharma, South Asian University New Delhi.	Dr. V. P. Ramesh	Oct. 25, 2018 – till now
5	Dr K. Sakthivel, Indian Institute of Space, Science and Technology (IIST), Thiruvananthapuram, India	Dr. N. Barani Balan	2017-till Now
6	Dr L. Shangerganesh, NIT Goa	Dr. N. Barani Balan	2014 - till Now
7	Dr. Amar Nath, SLIET Sangrur, Punjab	Dr. Virendra Kumar	Dec. 2021 - till now
8	Prof. Rajdeep Niyogi, IIT Roorkee	Dr. Virendra Kumar	Dec. 2021 - till now
9	Dr. Tajinder Singh, SLIET Sangrur, Punjab	Dr. Virendra Kumar	Dec. 2021 - till now

Refresher Course details

Name of teacher who attended	Title of the program	Duration
Dr. V. P. Ramesh	Online Refresher Course on Mathematics/ Operational Research/ Statistics and Computer Science (IMD), conducted by CPDHE, UGC-HRDC, University of Delhi	04-10-2021 to 18-10-2021
Dr. N. Barani Balan	Online Refresher Course in Mathematical Science conducted by the UGC-HRDC, University of Calicut	20-10-2021 to 02-11-2021
Dr. T. Kavaskar	Online Faculty Development Programme on Mathematical Analysis, UGC-HRDC, Punjab University under RUSA 2.0 grant	04-01-2022 to 10-01-2022
Dr. S. V. Bharanedhar	Online Faculty Development Programme on Mathematical Analysis, UGC-HRDC, Punjab University under RUSA 2.0 grant	04-01-2022 to 10-01-2022

Placement details

Year	Name of student placed	Program graduated from	Name of the employer
2022	Dr. S. Gokulraj	Ph.D. Mathematics	IIIT Dhaward, Dharward
2022	Dr. G. Narayani	Ph.D. Mathematics	Dayananda Sagar University, Bangalore
2022	Dr. R. Kamalakkannan	Ph.D. Mathematics	SRM University, Trichy

Ph.D. awarded

1. G. Divyabharathi was awarded Ph.D. in Mathematics under the supervision of Dr. T. Sengadir.
2. A. Arivazhagan was awarded Ph.D. in Mathematics under the supervision of Dr. N. Barani Balan.
3. R. Kamalakkannan was awarded Ph.D. in Mathematics under the supervision of Dr. R. Roopkumar.
4. G. Narayani was awarded Ph.D. in Mathematics under the supervision of Dr. V. P. Ramesh.

Achievements by students

1. Kousalya R, Integrated M.Sc Student, cleared UGC-Net 2021.
2. Devi S, Integrated M.Sc Student, cleared Gate 2021.

Paper presentation by Research Scholars

1. Presented a paper on “Non-Darcian gravitactic bio convention with a porous saturates vertical vibration” at 1st international Conference on Applied Analysis, Computation and Mathematical Modeling in Engineering, NIT Rourkela from 24.02.2021 to 26.02.2021 by K. Srikanth.
2. Presented a paper on “Vertically vibrated suspension of gyrotactic swimmers in a non-Darcy porous medium” at 2nd International Conference on Fluids Under Confinement, IIT Kharagpur from 14.03.2021 to 31.04.2021 by K. Srikanth.
3. Presented a paper on “Instability analysis of vertically vibrated suspension of gyrotactic swimmers in a thermally stratified porous media, National e-conference “Recent Trends in Fluid Dynamics Research”, NIT Rourkela from 02.04.2021 to 04.04.2021 by K. Srikanth.

About a Mathematician



Maryna Viazovska

Maryna Sergiivna Viazovska was born on 2 December 1984 is a Ukrainian mathematician. She competed in domestic mathematics Olympiads when she was at high school, placing 13th in a national competition where 12 students were selected to a training camp before a six-member team for the International Mathematical Olympiad was chosen. As a student at Taras Shevchenko National University of Kyiv, she competed at the International Mathematics Competition for University Students in 2002, 2003, 2004, and 2005, and was one of the first-place winners in 2002 and 2005. She co-authored her first research paper in 2005.

In 2016, Viazovska solved the sphere-packing problem in dimension 8. Her dimension 8 solution quickly led to a solution in dimension 24. Previously, the problem had been solved only for three or fewer dimensions, and the proof of the three-dimensional version (the Kepler conjecture) involved long computer calculations. In contrast, Viazovska's proof for 8 and 24 dimensions is "stunningly simple".

Viazovska is also known for her research on spherical designs with Bondarenko and Radchenko. With them she proved a conjecture of Korevaar and Meyers on the existence of small designs in arbitrary dimensions. This result was one of the contributions for which her co-author Andriy Bondarenko won the Vasil A. Popov Prize for approximation theory in 2013.

She was awarded the Fields Medal in July 2022, making her the second woman (after Maryam Mirzakhani 2014), the second person born in the Ukrainian SSR and the first with a degree from a Ukrainian university to ever receive it. She was honored as one of the BBC 100 Women in December 2022.

Her Fields Medal citation reads as follows: "Maryna Viazovska is awarded the Fields Medal 2022 for the proof that the E8 lattice provides the densest packing of identical spheres in 8 dimensions, and further contributions to related extremal problems and interpolation problems in Fourier analysis".