



DEPARTMENT OF
MATHEMATICS
BITS PILANI
HYDERABAD CAMPUS

Assari



MAR-APR 2024
VOLUME 2 ; ISSUE 2



About Us



The department of Mathematics was established in 2008, along with the Hyderabad Campus of BITS Pilani. Presently, the department offers Integrated MSc, PhD in Mathematics, and Minor in Data Science in collaboration with the Computer Science Department. We also offer various courses and programs to industry professionals through Work Integrated Learning Programs (WILP).

The department has 28 faculty members, out of which 3 are Professor, 12 are Associate Professor and 13 are Assistant Professor. Our faculty members are actively engaged in conducting research in multi-dimensional areas of Mathematics such as Algebra, Analysis, Applied Statistics, Computational Fluid Dynamics, Cosmology & Relativity, Cryptography, Differential & Integral Equations, Graph Theory, Mathematical Modeling, Number Theory, and Quantum information.

Since its establishment, the department has awarded 21 PhDs, the recipients of which are now working in reputed institutions or pursuing Post-Doctoral research abroad. Currently, the department has 68 PhD students.

The department has a well-furnished computational lab with 20 computers equipped with MATLAB, Mathematica and Statgraphics. It has one main node and two computational nodes. This is supported by the FIST grant received by DST, Govt. of India.



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As far as the laws of mathematics refer to reality, they are not certain, and as far as they are certain, they do not refer to reality.
-- Albert Einstein

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— Academic Visits



Prof. P K Sahoo visited Department of Mathematics, Sambalpur University during 27 - 28 March 2024.



Prof. Sumit Kumar Vishwakarma delivered an Invited talk at National Conference on Augmented Reality (AR) Policy on E-commerce for sophisticated supply chain system

— Achievements



Prof. P K Sahoo was recognized as an "Outstanding reviewer" by the Canadian Journal of Physics

— Travel Grants

Nitin Kumar Sharma received ACNS Student Travel Grant of \$1500 to attend 22nd International Conference on Applied Cryptography and Network Security, Abu Dhabi, UAE during 5 - 8 March 2024. At this conference, he presented his poster titled "Salsa20 Cipher: Assigning Values to Probabilistic Neutral Key Bits".



Tapaswini Patro received funding of £GBP 350 from the University of Strathclyde, Glasgow, U.K to attend the INSQT Workshop 4, Physical Research Laboratory (PRL), Ahmedabad, Gujarat during 20 - 22 March 2024. At this workshop, she delivered a talk on "Application of Steering Inequality in QKD protocol".



PhD Awardees



Scholar: **Mr. Ghale Vinodkumar Rajlingappa**
 PhD thesis: **Arithmetic of Heronian Elliptic Curves**
 Supervisor: **Prof. Debopam Chakraborty**
 Final Viva-voce: **20 March 2024**

&

Scholar: **Mr. A Sri Sakti Swarup**
 PhD thesis: **Class of Operators on Variable Exponent Sequence Spaces and their Corresponding Ergodic Version**
 Supervisor: **Prof. Michael Alphonse**
 Co-Supervisor: **Prof. Manish Kumar**
 Final Viva-voce: **21 March 2024**



73939133 is the largest prime known with the curious property: if you take one or more digits off the end, the resulting numbers are all prime



Class of 2025: MSc Mathematics



Conferences and Workshops

Workshop on Multi-Scale Analysis cum Conference on Differential Equations (MSADE-24). IIT - ROPAR ; 26 February - 2 March 2024



From left: Ankur Pandey, Suman Prabha Yadav, Debarati Mondal, and Sangeeta Dhawan

Paper Presentations @ MSADE-24

- "Necessary and Sufficient Condition on Musielak-Orlicz-Sobolev Embedding" by Ankur Pandey.
- "Besov and Triebel-Lizorkin capacity in metric spaces" by Debarati Mondal.
- "Discrete Hadamard fractional difference equations on time scales" by Sangeeta Dhawan.
- "Global Existence and Asymptotic Behaviour for a nonlinear viscoelastic plate equation" by Suman Prabha Yadav.



Debismita Nayak attended an Online Faculty Development Program on Recent Developments in Statistics and its Applications in Data Science at **VIT Chennai** during 27 - 31 March 2024.

Sushil Pathak attended a workshop on Mathematical modeling and Computations for Infectious Diseases at **K.K. Birla BITS Goa Campus** during 12 -13 April, 2024.



—Publications

* indicates Q1 journal



- Chandan Dey, **Sabyasachi Dey**, Rahul Girme and Santanu Sarkar. "[Enhancing the Key Recovery Attack on Round Reduced Salsa](#)." IEEE Access.
- Debasmita Mohanty**, **Sayantan Ghosh**, and **P K Sahoo** "[Study of charged gravastar model in \$f\(Q\)\$ gravity](#)." Annals of Physics.
- Debismita Nayak** and **T S L Radhika** "[On Building Machine Learning Models for Medical Data Set with Correlated Features](#)." Computational and Mathematical Biophysics .
- Gaurav Gadbail** and **P K Sahoo**. "[Modified \$f\(Q\)\$ gravity models and their cosmological consequences](#)." Chinese Journal of Physics.
- Lakhan V Jyabhaye**, **Moreswar Tayde** and **P K Sahoo**. "[Wormhole solutionns under the effect of dark matter in \$f\(R, Lm\)\$ gravity](#)." Communications in Theoretical Physics.
- Nitin Kumar Sharma** and **Sabyasachi Dey**. "[Analyzing the Probability of Key Recovery in the Differential Attacks Against ChaCha](#)." IEEE Access.
- Parbati Sahoo, Sanjay Mandal, **P K Sahoo**. "[A New Way to Construct Wormholes in Modified Gravity](#)." Current Perspective to Physical Science Research.
- Sayan Ghosh** and Palaniappan Vellaisamy. "[Closed-form estimates for missing counts in multidimensional incomplete tables](#)." Hacettepe Journal of Mathematics and Statistics.
- Sayantan Ghosh**, **Raja Solanki** and **P K Sahoo**. "[Dynamical system analysis of scalar field cosmology in coincident \$f\(Q\)\$ gravity](#)." Physica Scripta.
- Sai Swagat Mishra**, **Aaqid Bhat** and **P K Sahoo**. "[Probing baryogenesis in \$f\(Q\)\$ gravity](#)." Europhysics Letters.
- Simran Arora and **P K Sahoo**. "[Revisiting kink-like parametrization and constraints using OHD/Pantheon/BAO samples](#)." Physics of the Dark Universe.*

—Know a Mathematician: Carl Friedrich Gauss



Carl Friedrich Gauss, born on April 30, 1777, in Brunswick, Germany, was a prodigious mathematician and scientist. He worked in a wide variety of fields in both mathematics and physics, including number theory, analysis, differential geometry, geodesy, magnetism, astronomy and optics. Notably, he constructed the heptadecagon using a ruler and compasses, advanced the prime number theorem, and developed the method of least squares. Gauss also excelled in physics, particularly in magnetism and astronomy, predicting the orbit of Ceres. Despite personal tragedies, he remained dedicated to research until his death on February 23, 1855, in Göttingen, Germany. His legacy continues to influence many scientific areas.

It is not knowledge, but the act of learning, not the possession of but the act of getting there, which grants the greatest enjoyment.

— Our Faculty

Prof. Manish Kumar

Prof. Manish Kumar, an Associate Professor at the Birla Institute of Technology and Science-Pilani (BITS Pilani) Hyderabad Campus, epitomizes academic excellence and research prowess. With a distinguished background in mathematics and an unwavering passion for advancing knowledge in his field, Prof. Kumar has left an indelible mark on academia and scientific research. Prof. Kumar's academic journey began with his PhD in Mathematics from the IIT (ISM), Dhanbad, where he immersed himself in the intricate realms of pseudo-differential operators. Subsequently, his further research work after his PhD at DST CIMS, Faculty of Science, Banaras Hindu University, focused on wavelet analysis and its diverse applications, laying the foundation for future contributions to the field.

Joining the BITS Pilani Hyderabad Campus faculty in 2012 marked the beginning of Prof. Kumar's journey of academic excellence and research innovation. As an Associate Professor of Mathematics, he has played a pivotal role in shaping the academic landscape of the institution, imparting knowledge and igniting the passion for mathematics in his students. Prof. Kumar's teaching repertoire spans various mathematical disciplines, including Real Analysis, Measure and Integration, Calculus, Linear and Abstract Algebra, Probability and Statistics, Optimization, Operation Research, etc.

His pedagogical approach is characterized by clarity, enthusiasm, and a deep commitment to nurturing students' mathematical understanding, instilling a lifelong love for the subject. His passion for mathematics is evident in his eagerness to discuss it at any level. He enjoys sharing his unique perspective on the subject, making him an ideal teacher. His exceptional qualities include his openness, patience, and knack for meeting students at their individual levels. This approach fosters personalized growth, allowing each student to progress at their own pace and according to their abilities.

Prof. Kumar is a prolific researcher whose scholarly endeavours have earned him recognition both nationally and internationally. His research interests encompass pseudo-differential operators, wavelet analysis, functional analysis, and the interdisciplinary applications of mathematics in engineering and science, especially in information security. Through his seminal contributions to mathematical research, Prof. Kumar has enriched our understanding of fundamental mathematical concepts while paving the way for innovative applications in diverse domains. His extensive publication record in reputable peer-reviewed journals reflects the breadth and depth of his scholarly contributions, including a patent. He is a Fellow of the Institute of Mathematics and its Application (FIMA), London, United Kingdom. Prof. Kumar's research findings have advanced



the frontiers of mathematical knowledge and found practical utility in fields such as image encryption and signal processing.

Prof. Kumar is deeply committed to fostering the next generation of mathematicians and researchers, guiding them with his expertise and invaluable insights. Prof. Kumar's research endeavors have been supported by funding from prestigious organizations such as the Science and Engineering Research Board (SERB), the Department of Science and Technology (DST), the University Grants Commission (UGC), the National Board for Higher Mathematics (NBHM) under the auspices of the Department of Atomic Energy (DAE) and BITS-Pilani, Hyderabad Campus.

Prof. Manish Kumar's contributions to mathematics and scientific research are invaluable, shaping the future of academia and inspiring generations of mathematicians and researchers. Prof. Kumar has guided numerous PhD and MSc students as a mentor, providing guidance, encouragement, and invaluable insights gleaned from his research experiences. Several of his students have successfully defended their dissertations under his supervision, further testament to his prowess as a mentor and educator. Dr. Tusharakanta Pradhan successfully defended his PhD dissertation under Prof. Kumar's supervision. Additionally, Prof. Kumar was a co-supervisor for Dr. A Sri Sakti Swarup. Dr. Kumar is currently the PhD supervisor for Vrushali Limaye, Bhawna, and Animesh Singh and co-supervisor for Abhinav Kumar (CS Department).

— Our Faculty

Prof. T S L Radhika

Prof. T S L Radhika completed her PhD from the National Institute of Technology, Warangal in 2010, establishing a strong foundation in her field. Her commitment to staying abreast of technological advancements is evident from her completion of a 5-month Certificate Enhancement Program on Quantum Computing and Machine Learning from IIT Delhi in 2022.

With a multifaceted career, Prof. Radhika has demonstrated dedication to both academia and student welfare. Since 2013, she has served as a non-resident warden for the girls' hostel at BITS Pilani, Hyderabad campus, and has actively participated in student counselling initiatives at various institutions, showcasing her commitment to student well-being.

Prof. Radhika's academic contributions are significant. She has authored or co-authored 39 research papers and presented 28 conference papers, highlighting her expertise and active engagement in scholarly discourse. Additionally, she has contributed chapters to esteemed publications such as Springer Nature and Nova Science Publishers, further solidifying her reputation as a respected academician.

Her professional engagements extend globally. She has collaborated on a Ministry of Defense project at the Military Technological College in Muscat, Oman, and served as an honorary associate at the Department of Biomedical Engineering, University of Wisconsin, Madison, USA. These international collaborations underscore her global influence and contribution to research.

Prof. Radhika is actively involved in faculty development programs and editorial responsibilities. She has participated in various workshops and training programs focused on data science, instructional design, and counselling. Moreover, she serves as an editorial member for several esteemed journals,



contributing to the advancement of scientific knowledge. Her research interests lie in Fluid Dynamics, Machine Learning, and Quantum Computing.

She is currently working on: Steady/unsteady flows of non-Newtonian fluid through rigid/elastic circular pipes with applications in the human circulatory system, Approximate analytical solutions and numerical solutions to heat transfer problems in porous media, Fluid flow problems in non-conventional coordinate systems, Data analysis to interpret and draw meaningful conclusions from experimental and simulation data.

Prof. Radhika is also an active member of several professional societies, including the Indian Society for Theoretical and Applied Mechanics, the Andhra Pradesh Society for Mathematical Sciences, the International Association of Engineers, and the Indian Society for Technical Education. These affiliations enable her to stay connected with the broader academic community and foster collaborations.

She has guided Dr. Alasakani Karthik for his PhD. Currently, Kakani Ketana and Debismita Nayak are pursuing their PhD under her supervision.

— *First Degree Alumni*



Sajal Agarwal

Sajal Agarwal joined BITS in 2012, pursuing a dual degree in Mathematics and Computer Science. Engaging in research projects with Prof. Manish Kumar and Dr. Nemili Anil, he co-authored a paper published in the Multimedia Tools and Applications journal on image encryption using the virtual planet domain. Graduating in 2017, he joined Amazon and now works as a Senior Software Engineer, leading core payment processing features to develop fast, secure, and reliable payment systems.

Subhrat Praharaj

Subhrat Praharaj is a first-year PhD candidate at the Anton Pannekoek Institute for Astronomy, University of Amsterdam. His research focuses on resistive general relativistic magnetohydrodynamic simulations of black hole jets and disks. His journey began at BITS Hyderabad in 2018, where he pursued Mechanical Engineering and Mathematics. His passion for fluids, numerical methods, and turbulence led him to projects on fluid-structure interactions and wave solutions in various matter fields, including a significant project under Dr. Sumit Vishwakarma studying wave solutions in matter fields with intrinsic homogeneities. After internships at Caltech-JPL and the Simon's Foundation, he found his niche at the intersection of physics, math, and engineering, ultimately leading him to pursue a PhD in astrophysics.



Prateek Gupta



He obtained an M.Sc. in Mathematics and a B.E. in Computer Science from BPHC in 2020. He commenced his professional journey as an SDE intern at Amazon, advancing to the role of a seasoned SDE-2 over four years. During this time, he played a pivotal role in spearheading the development and implementation of several groundbreaking products, including the "Amazon Pay For Business" Android application, facilitating seamless payments for merchants, QR code integration for UPI Payments, and an HR Support portal tailored for employee engagement.

Proficient in full-stack development, he has leveraged technologies such as AWS, Java, React, and MicroFrontend Architecture to deliver robust solutions. Additionally, he has contributed to Amazon's talent acquisition efforts as an interviewer. Presently, he is committed to mentoring the team and junior developers to elevate their software development skills and drive impactful initiatives.

— PhD Alumni



Dr. Alasakani Karthik

Assistant Professor, Department of Mathematics,
Joy University, Tamil Nadu

His area of research is bio fluid dynamics, a field that combines principles of fluid mechanics with biological systems to understand the behavior of fluids in living organisms. He focuses on the study of blood flow in human arteries, employing mathematical modeling and statistical analysis to investigate how blood moves through these vessels. His PhD thesis showcases his expertise in analyzing the complexities of blood flow in tapered, elastic arterial structures. With ten research papers published, his contributions have significantly advanced the scientific understanding of arterial blood flow dynamics. Besides his research endeavors, he serves as the Assistant Dean - Academics at Joy University, near Kanyakumari. In this role, he plays a crucial part in academic administration, overseeing curriculum development, and ensuring the academic programs meet high standards of excellence. His dual roles highlight his dedication to both scientific research and academic leadership.

PhD Thesis: A Study of Fluid Flow in Tapered Elastic Pipes with Applications in Human Arterial System

Supervisor: Prof. T S L Radhika

Co Supervisor: Prof. D K Satpathi

Year of Conferral : 2022

Dr. V Selvakumar

Assistant Professor, Department of Mathematics and Statistics
Bhavan's Vivekananda College of Science, Humanities and Commerce,
Secunderabad, Telangana

His academic journey is marked by a profound interest in various domains, including high-dimensional data analysis, time series modeling, biostatistics, actuarial science, Machine Learning, and Deep Learning. With a keen focus on applying these disciplines, his primary research centers around the modeling and prediction of motor insurance claims utilizing innovative machine-learning approaches. He possesses a rich and extensive experience spanning 23 years, during which he has authored 34 papers, which have been featured in various prestigious national and international journals. Remarkably, 17 of these papers have been indexed in SCOPUS, highlighting the quality and relevance of his research contributions to the broader academic community. His innovative insights have led to the development of five patent publications, underscoring his ability to translate theoretical concepts into practical applications with tangible real-world implications. Additionally, his literary prowess is demonstrated through the authorship of five books, which serve as invaluable resources for students, researchers, and professionals seeking to delve deeper into the intricacies of statistics and related disciplines.



PhD Thesis: Empirical Modeling and Predicting Motor Insurance Claims Using Machine Learning Approaches

Supervisor: Prof. P T V Praveen Kumar

Co Supervisor: Prof. D K Satpathi

Year of Conferral : 2022



BITS Pilani
Hyderabad Campus
Department of Mathematics

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