Agant

innovate   achieve   lead

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> Science is a differential equation. Religion is a boundary condition.
>
> **- Alan Turing**

EVENTS

Persona Grata

The word "hundred" comes from the old Norse term, "hundrath", which actually means 120 and not 100.

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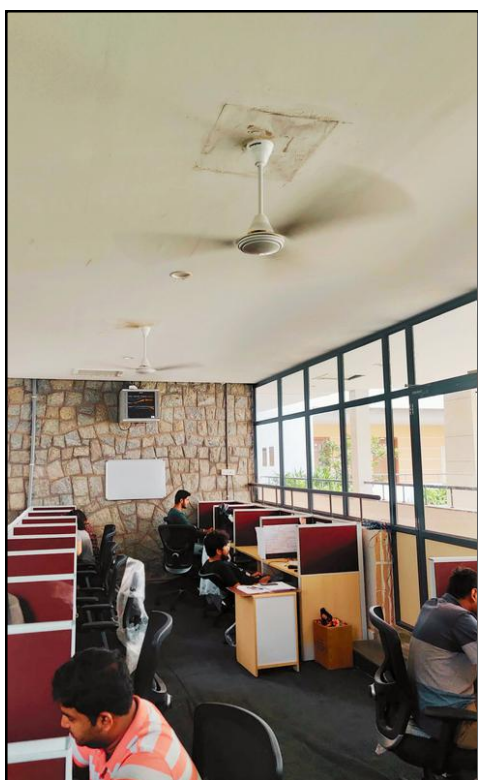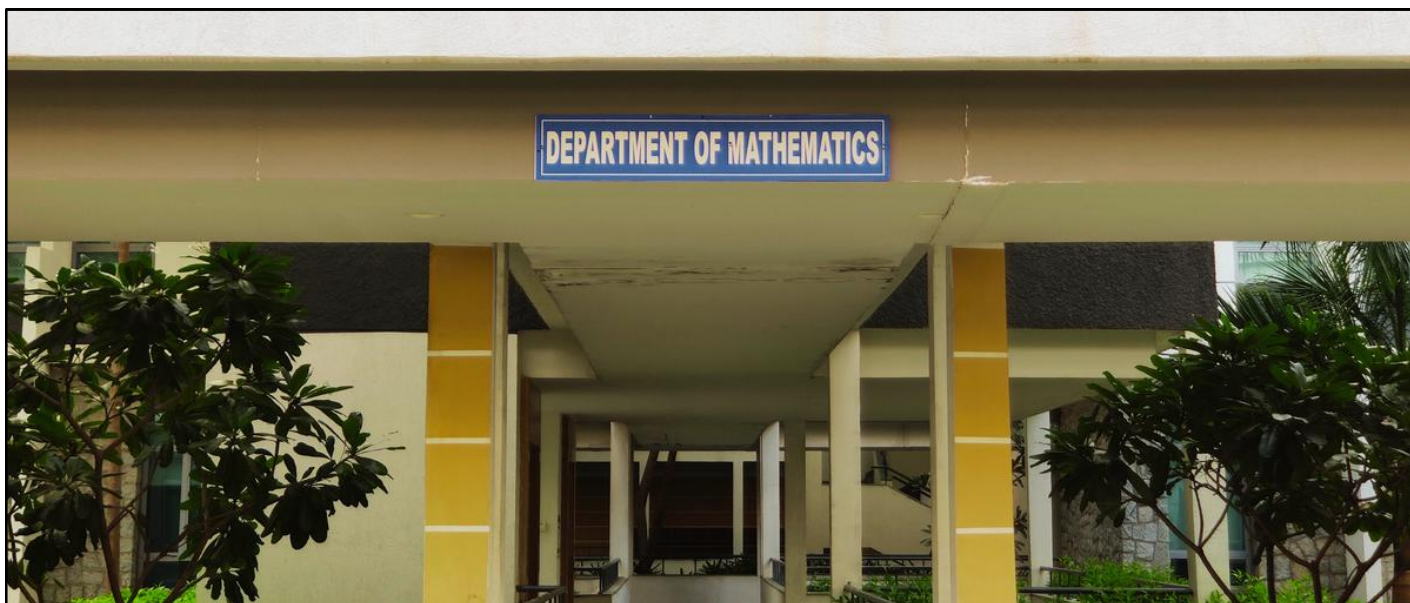
The Department of Mathematics was established in 2008, along with the Hyderabad Campus of BITS Pilani. Presently, the department offers Integrated MSc, PhD in Mathematics, and Minor in Data Science in collaboration with the Computer Science Department. We also offer various courses and programs to industry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

The department has 28 faculty members, of which 3 are professors, 12 are associate professors, and 13 are assistant professors. 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 30 PhDs, the recipients of which are now working in reputed institutions or pursuing Post-Doctoral research abroad. Currently, the department has 59 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.

Academic Visits & Invited Talks
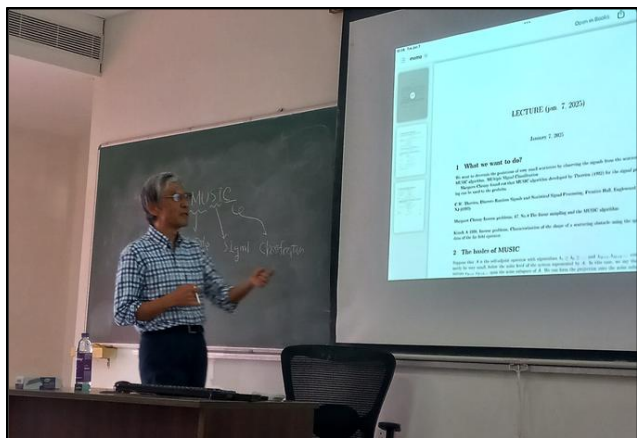
Prof. Terumi Touhei from **Emeritus Professor from Tokyo University of Science,** delivered a talk on the **Multiple Signal Classification (MUSIC) Algorithm**, on Jan 7, 2025.

Prof. Rajendra Gupta from the **University of Ottawa** delivered a talk on **"Is the Universe 26.7 Billion Years Old with No Dark Matter or Dark Energy?"** on Jan 7, 2025.

Prof. P.K. Sahoo visited Faculty of Mathematics and Natural Sciences, **University of Oslo, Oslo, Norway** during 13-17 January 2025

Prof. P.K. Sahoo delivered an invited talk at the "Conference on Cosmology, Astrophysics, and Particle Physics (CCAPP 2025)" held at **SRM University, Chennai, India** during 30 January-02 February 2025.

— Academic Visits & Invited Talks

Prof. P.K. Sahoo delivered an invited talk at the **National Conference on "Partial Differential Equations: An application to optimization Techniques (PDEAOT-2025)"** held at **Department of Mathematics, Khallikote Unitary University, Berhampur, Odisha, India** during 22-23 February 2025.

Prof. P.K. Sahoo delivered an invited talk at the International Conference on "Applications of Mathematical & OR Models for Sustainable Viksit Bharat (ICORSVB 2025)" held at **Department of Mathematics, Parala Maharaja Government Engineering College, Berhampur, Odisha, India** during 21-22 February 2025.
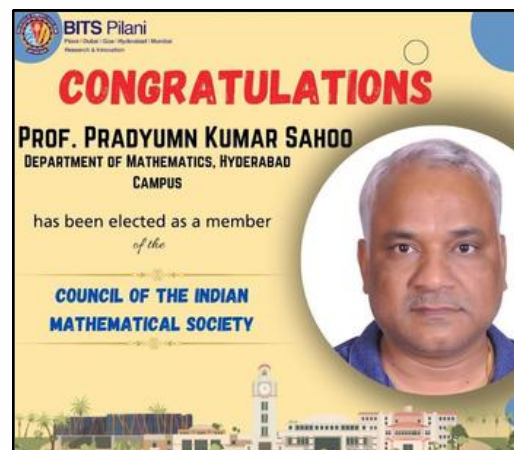

— Achievements and Travel Grants

Prof. P.K. Sahoo has been elected as a member of the prestigious **International Astronomical Union (IAU)** from January 2025.

Prof. P.K. Sahoo has been elected as a Council Member of the **Indian Mathematical Society (IMS)** for 3 years starting from 1st April, 2025.

Achievements and Travel Grants

Santanu Kumar Dash received BITS international travel grant to attend the **15th international conference on Power, Energy, and Electrical Engineering,** held in **Fukuoka, Japan.**

Prof. Gujji Murali Mohan Reddy became **Associate Editor** for **Computational and Applied Mathematics** (IF: 2.5, MCQ: 0.48), Springer (Feb, 2025 onwards).

Prof. P.K. Sahoo has been honored with the **Vice Chancellor's Award for "Most Consistent Researcher"** from BITS Pilani on February 28, 2025.


Sai Swagat Mishra received funding from **University of Oslo, Norway** to attend the workshop **Quantum groups, tensor categories and quantum field theory.**

Conferences and Workshops

Debasmita Mohanty presented a paper on **Study of gravastar model in f(T) gravity** at the **33rd Indian Association for General Relativity and Gravitation** held at **BITS Pilani, Pilani Campus,** from January 2-4, 2025.

Sayantan Ghosh presented a paper on **Dynamical System Analysis of General Scalar field cosmology and background in general symmetric teleparallel gravity** at the **33rd Indian Association for General Relativity and Gravitation** held at **BITS Pilani, Pilani Campus,** from January 2-4, 2025.
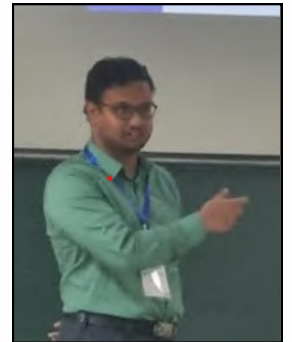
Kartik Vilas Tathe presented a paper on **Non Homogeneous Generalized Fractional Skellam Process** at the **11th International Conference on Mathematics and Computing** held at **IIT Bhilai** from January 9-11, 2025.

Shivam Kumar Mishra attended a workshop**, "Second School on Black Holes and Gravitational Waves",** held at **IIT Madras** from February 10-14, 2025.

Moreshwar Tayde attended a workshop, **"Second School on Black Holes and Gravitational Waves",** held at **IIT Madras** from February 10-14, 2025.

— Conferences and Workshops

Santanu Kumar Dash presented paper on **Impact of Sloping Lip Wall on the Efficiency of a Duct-type OWC Device Placed over an Inclined Foundation** and **Parameters Optimization of Oyster Wave Energy Converter Devices using Artificial Neural Network Model** at the **15th International Conference on Power, Energy, and Electrical Engineering (CPEEE 2025)** held at **TKP Garden City Hakata, Fukuoka, Japan** from February 15-17, 2025.

Amya Ranjan Ray presented a paper on **Hydrodynamic Analysis of Multi-Chamber Oscillating Water Column Device Using RANS Model** at the **15th International Conference on Power, Energy, and Electrical Engineering (CPEEE 2025)** held at **TKP Garden City Hakata, Fukuoka, Japan** from February 15-17, 2025.

Prof. Sumit Kumar Vishwakarma presented a paper on **Reflection-Transmission Coefficients of SH Waves Across Thin-Walled Spring-Membrane Strain Gradient Interface** at the conference, "**Mathematics of Wave Phenomenon**", held at **Karlshrue, Germany** from February 24-28, 2025.

Sunita Kumawat presented a paper on **Characteristics of wave propagation in Pre-stressed Viscoelastic Timoshenko Nanobeams with Surface Stress and Magnetic Field Influences** at the conference, "**Mathematics of Wave Phenomenon**", held at **Karlshrue, Germany** from February 24-28, 2025.

Rajdip Dey presented a paper on **A Novel Design of Hybrid Solar Wave Energy Converter for Sustainable Offshore Power Generation**, at the conference,**International Conference on Greener Technologies in Mechanical Engineering (ICGTME 2025),** held at **BITS-Pilani, Pilani Campus,** from February 3-4, 2025.

PhD Awardees

Scholar: **Mr. Zinnat Hassan** (2019PHXF0463H)
PhD Thesis: **Exploring Wormholes in Modified Theories of Gravity**
Supervisor: **Prof. Pradyumn Kumar Sahoo**
Final Viva-voce: **9th January, 2025**

Scholar: **Mr. Kadam Siddheshwar Atmaram** (2020PHXF0002H)
PhD Thesis: **Dynamical and Cosmological Aspects of Teleparallel and Extended Teleparallel Gravity**
Supervisor: **Prof. Bivudutta Mishra**
Final Viva-voce: **15th January, 2025**

Scholar: **Ms. Aleena Philip** (2019PHXF0038H)
PhD Thesis: **Tensor Norms and Operator Ideals Defined by Mid Summable Sequences**
Supervisor: **Prof. Deepika**
Final Viva-voce: **30th January, 2025**

Scholar: **Mr. Raja Solanki** (2020PHXF0003H)
PhD Thesis: **"Accelerating Expansion of the Universe in Modified Symmetric Teleparallel Gravity"**
Supervisor: **Prof. Pradyumn Kumar Sahoo**
Final Viva-voce: **4th February, 2025**

Scholar: **Mr. Lohakare Santosh Vijay** (2020PHXF0052H)
PhD Thesis: **Late Time Cosmic Acceleration in Modified Gravity and Gauss-Bonnet Cosmology**
Supervisor: **Prof. Bivudutta Mishra**
Final Viva-voce: **28th February, 2025**

Publications

- **Narawade, S. A., Lohakare, S. V., and Mishra, B. (2025).** Stable f (Q) gravity model through non-trivial connection. **Annals of Physics, 474, 169913. ***

- **Narawade, S. A., and Mishra, B. (2025).** Insights into f (Q) gravity: modeling through deceleration parameter. **Journal of High Energy Astrophysics. ***

- **Mishra, S. S., Fortunato, J. A. S., Moraes, P. H. R. S., and Sahoo, P. K. (2025).** Cosmography of f (R, L, T) gravity. **Physics of the Dark Universe, 101831. ***

- **Kumar, M., Chivukula, A. S., and Barua, G. (2025).** Deep learning-based encryption scheme for medical images using DCGAN and virtual planet domain. **Scientific Reports, 15(1), 1211. ***

- **Kumar, M., and Bhawna. (2025).** Special Affine Fourier Transform on Tempered Distribution and Its Application. **Mathematical Methods in the Applied Sciences.**

- **Swami, K. C., Dash, S. K., & Koley, S. (2025).** Water Waves Scattering by Floating Rigid Dock and Breakwaters Using Improved Singular Boundary Method Under Regular and Irregular Waves. **Results in Engineering, 104420. ***

- **Gupta, V., Kumawat, S., Vishwakarma, S. K., Barak, M. S., and Das, S. (2025).** Effects of layer imperfections and material gradation on circumferential shear horizontal waves in cylindrical piezoelectric composite structure. **Composite Structures, 118997. ***

- **Kumawat, S., and Vishwakarma, S. K. (2025).** Reflection-transmission coefficient of SH waves in a layered interface with spring sandwiched between thin membranes: An application of strain gradient theory. **Mechanics of Advanced Materials and Structures, 1-11.**

- **Mishra, S. S., Kavya, N. S., Sahoo, P. K., and Venkatesha, V. (2025).** Impact of Teleparallelism on Addressing Current Tensions and Exploring the GW Cosmology. **The Astrophysical Journal, 981(1), 13. ***

AXIOM Events

Axiom, the Mathematics Association of BITS Pilani, Hyderabad Campus, organized a series of events and talks throughout January and February.

On Jan 16th, an **Interactive Session with the professors** of the Mathematics Department was held, all B4 students and teachers in the department were invited. Giving them a change to mesh, clear doubts, discuss academic concerns, connecting with professor in an open and engaging environment.

On Feb 25th, a **Movie Screening** was held in F106 after the class work was finished for the day. Providing respite amidst the long and hard midsemester studies. Good Will Hunting is one of Gus Van Sant's finest, a film that mixes wit, emotion, and wisdom

On Jan 25th, an Engaging interactive session with **Prof. Terumi Touhei** from Tokyo University of Science, Japan was held. He explored his journey from calculations to creations and discussed the role of math's in engineering. He talked about building more stable structure, using his background in civil engineering and even motivated students to keep focus on mathematics for innovation in science.

UPCOMING EVENT:

Axiom's flagship event, **Integration Bee**, is set to take place soon, bringing an exciting challenge for mathematics enthusiasts. The competition will kick off with Round 1 on March 26, testing participants on their problem-solving skills and mathematical intuition. Those who advance will compete in the second round, scheduled for April, where they will face even more stimulating problems. Stay tuned for further details.

Research Scholar Weekly Talk

Dr. Sushil Bhunia delivered a talk on a friendly **introduction to hyperbolic geometry.** He lead the audience thorugh a gentle and intuitive journey into hyperbolic geometry. In this fascinating non-Euclidean space, parallel lines behave unexpectedly, triangles have curious angle sums, and distances stretch in surprising ways. exploring key features such as the hyperbolic plane, models like the Poincare disk, and how this geometry appears in nature.

Mr. Kolhatkar Ameya Uday gave an **Introduction of a topological manifold** to the audience. The differentiable manifold is an essential structure in the study of the general theory of relativity. In this talk he will tried to construct the mathematical structure of a simple manifold starting from a given set.

Mr. Shayon Bhadra addressed the audience with the **Proof of Fundamental Theorem of Algebra using the tools of Linear Algebra.** There are several proofs of the Fundamental Theorem of Algebra. In this talk, he showed how linear maps and eigenvectors play a role in proving the fundamental theorem of algebra.

Mr. Raja Solanki will delivered a talk on the **Parameter estimation using the MCMC.** He explained how the MCMC (Markov Chain Monte Carlo) is the most popular method to estimate the best-fit value of free parameters of a given model using the data. The use of Bayesian statistics along with the MCMC process is one of the efficient techniques in the computation field of science.

Aganit

— Upcoming Events :

Workshop/Conference	Domain	Venue & Schedule	Deadline
Cimpa School on Automorphic L Function	Algebra	**IIT Ropar, India** 30 Jun - 11 Jul 2025	**March 30, 2025**
Analysis and Partial Differential Equations	Analysis & PDE	**IIT Ropar, India** 26 May - 14 Jun 2025	**March 31, 2025**
Probability & Applied Analysis	Probability & Statistics	**Feza Gürsey Center for Physics and Mathematics, Istanbul, Turkey** 30 Jun - 12 Jul 2025	**March 30, 2025**
Mathematics for Machine Learning	Algebra, Probability & Statistics	**Birla Institute of Technology & Science Pilani, Hyderabad** 10 April - 12 April, 2025	**April 9, 2025**
Mathematical Foundation for Data Science and Machine Learning using MATLAB	Data Science & Machine Learning	**IIIT Naya Raipur, India** 02 Jun - 14 Jun 2025	**April 15, 2025**
K-theory and Operator Algebras	Algebra	**Argentina** 28 Jul - 08 Aug 2025	**April 28, 2025**
Arithmetic and Diophantine Geometry, via Ergodic Theory and o-minimality	Geometry & Topology	**IHES - Marilyn and James Simons Conference Center** 08 Sep - 12 Sep 2025	**May 31, 2025**

— Our Faculty

Prof. Sabyasachi Dey

Sabyasachi Dey is an Assistant Professor in the Department of Mathematics at BITS Pilani, Hyderabad Campus, India. He holds a Ph.D. in Mathematics from IIT Madras, where he conducted research under the guidance of Prof. Santanu Sarkar. He had strong focus on cryptography and quantum cryptanalysis areas that are increasingly relevant in today's digital landscape. Dr. Dey's research interests are diverse, encompassing symmetric cryptography, applications in security, and the field of quantum cryptography. He is passionate about exploring the intersection of these disciplines, aiming to develop innovative solutions to contemporary challenges in information security. His work has contributed to a deeper understanding of cryptographic protocols and their vulnerabilities, making significant strides in enhancing data protection mechanisms. In addition to his research, Sabyasachi is dedicated to teaching and mentoring students. He employs a hands-on approach in the classroom, encouraging critical thinking and problem-solving skills among his students. He is committed to fostering a collaborative learning environment and is always open to guiding students interested in pursuing research in mathematics and its applications. Dr. Dey actively participates in academic conferences and workshops, sharing his findings with the broader research community. He is also keen on collaborating with fellow researchers and industry professionals to further advance the fields of cryptography and machine learning. Sabyasachi Dey is a valuable asset to the academic community at BITS Pilani, inspiring the next generation of mathematicians and computer scientists.

Prof. Bhargav Kumar

Dr. Bhargav Kumar is actively involved in research and teaching. With a strong academic background, Dr. Bhargav specializes in areas such as Partial Differential Equations (PDEs), Numerical Analysis to PDEs and Functional analysis, contributing significantly to the advancement of these fields through innovative research projects.

His work often focuses on proving theoretical and computational methods to solve complex real-world problems, which arise in Population dynamics, Suspension Bridge problems etc. Dr. Bhargav is known for his collaborative approach, working with students and fellow researchers to foster an environment of learning and discovery. He has published numerous papers in reputable journals and has been invited to speak at various national and international conferences, sharing his insights on emerging technologies and their applications.

In addition to his research endeavors, Dr. Bhargav is dedicated to mentoring students, guiding them in their academic pursuits and encouraging them to engage in research activities. His passion for teaching and research makes him a valuable asset to the BITS community, inspiring the next generation of engineers and scientists. Through his contributions, including his invited talks, Dr. Bhargav continues to enhance the reputation of BITS Pilani as a leading institution in engineering and technology education.

— Our Faculty

Prof. Farida Parvez Barbhuiya

Prof. Farida Parvez Barbhuiya did her Bachelors in Mathematics from Cotton College, Gauhati University. Her Masters and PhD were from Indian Institute of Technology Kharagpur. She joined BITS Pilani, Hyderabad campus as an assistant professor in November 2020. Her broad areas of research are Queueing Theory and Stochastic Modeling. She mainly focusses on the modelling and analysis of infinite capacity queueing models with renewal arrival process.

Previous work of her were mainly concentrated on the steady-state solutions of queueing models, however currently she has shifted her focus to the transient analysis of the queueing models, which is relatively complicated than the steady-state counterpart. Her work has been published in some leading journals like Queueing Systems, Computers and Operations Research, Methodology and Computing in Applied Probability, RAIRO- Operations Research among others.

She has been a reviewer for many international journals such as RAIRO-Operations Research, Methodology and Computing in Applied Probability, Opsearch, Journal of Computational and Applied Mathematics among others. She has also completed one internally funded project at BITS-Pilani. She is currently supervising a PhD student and has also previously guided many students for their Bachelors and Masters thesis.

— Know a Mathematician : *Kurt Gödel*

Kurt Gödel was a thoughtful and deeply curious mathematician whose ideas reshaped the way we think about knowledge and certainty. Born in 1906 in Austria, he had a mind drawn to the deepest questions, wondering whether we could ever fully understand the world through logic alone. His groundbreaking Incompleteness Theorems revealed that even the most rigorous mathematical systems have limitations, that there will always be truths that cannot be proven from within.

This discovery shook the foundations of mathematics and sparked new conversations about the limits of reason. Though often reserved, Gödel shared a close friendship with Albert Einstein, and the two were known to take long walks together, lost in conversation. Gödel's work still inspires us to reflect on the mysteries that remain just beyond the reach of certainty in various proofs.

First Degree Alumni

Pooja Sinha

Pooja Sinha graduated from BITS Pilani Hyderabad Campus in 2017 with a dual degree in Mathematics and Computer Science. At BITS, she coauthored a paper titled "Domination on circulant graphs of 2 chord length" in Electronic Notes in Discrete Mathematics (Elsevier) under the guidance of Prof. Michael Alphonse. She was also a Teaching Assistant for the WILP program in the Mathematics department. Currently, Pooja is a Senior Software Developer at Microsoft where she works on designing and developing large scale solutions for the Azure Compute org.

Thommandra Sai Kaushik

Thommandra Sai Kaushik is a Senior Full Stack Developer at ReportGarden, a Bitsian company, where he leads engineering efforts to automate reporting for advertising agencies. He previously interned at the Murugappa Group, where he used the knowledge of Finite Element Analysis to optimize pipe production through stress analysis on steel mills. During his time at BITS, Kaushik served as a Teaching Assistant for the WILP program and was a student representative in the Mechanical and Manufacturing Association. His leadership extended to multiple roles, including Treasurer for NSS, Joint Director for SCIO, and Student Coordinator for Atmos, Pearl, and Arena. Additionally, he was a core member of the Nucleus Team for SWD and ARCD.

Sravanthi Edara

Sravanthi Edara graduated from BITS Pilani, Hyderabad Campus in 2011, with a dual degree in Mathematics and Mechanical Engineering. At BITS, she was actively involved with the Mathematics Department as a core member and event coordinator. She began her career as a Mechanical Design Engineer in the solar and oil & gas sectors, transitioned into product design, and now works as a freelance product designer, collaborating with startups across FinTech, EdTech, and other domains. Her work involves understanding user behavior, assessing technical feasibility, and refining user experience and design. Also, Sravanthi is working on So Himalayas, an initiative bringing clean, seasonal Himalayan produce to consumers. Her academic background in Mathematics has played a key role in shaping her analytical thinking and problem-solving approach across all her roles.

PhD Alumni

Dr. Ghale Vinodkumar Rajlingappa

Assistant Professor

D Y Patil International University, Pune

His research area is where many mathematical branches like number theory, algebra, algebraic geometry, and complex analysis converge, specifically pertaining to the arithmetic of Heronian elliptic curves, which are generalizations of congruent number elliptic curves in his thesis. His work involves identifying a family of Heronian elliptic curves with the non-trivial Shafarevich-Tate group, a mysterious object in mathematics. His work further surveys the difficulties in finding the rank of elliptic curves and ways to understand them deeply. He obtained his doctorate with financial support from CSIR, India, in March 2024, after which he joined Bhaskaracharya Pratishtan Pune as a post-doctoral fellow, where Prof. Chandrasheel Bhagwat from IISER Pune mentored him. Later, he joined as a regular assistant professor at D Y Patil International University, Pune, where he contributed to designing the syllabus of undergraduate programs, served as an academic in charge of undergraduate programs, and was an evaluator of Ph.D students.

PhD Thesis: Arithmetic of Heronian Elliptic Curves.
Supervisor: Prof. Debopam Chakraborty
Year of Conferral : 2024

Dr. Vipin V

Assistant Professor
SASTRA Deemed University, Thanjavur,Tamil Nadu

Dr. Vipin V earned his Ph.D. in the year 2023 under the guidance of Professor Shantanu Koley. He is currently working as an assistant professor in the Department of Mathematics at SASTRA Deemed University, Thanjavur, Tamil Nadu. His research primarily focuses on mathematical and machine learning models applied to wave energy converter devices. He has co-authored several notable publications such as "Power Generation Prediction of OWC Device Using Deep Neural Network Model," Mathematical Modeling of a Piezoelectric Wave Energy Converter Device Integrated with a Vertical Breakwater over a Stepped Seabed," and many other such papers. His contributions span across mathematical modeling, machine learning applications, and optimization techniques, particularly in the domain of WEC devices. His work has been widely acknowledged in the scientific community, paving the way for further innovations in optimizing renewable energy systems. As the demand for sustainable energy solutions grows, his contributions to the mathematical modeling of energy devices are expected to play a crucial role in future advancements.

PhD Thesis: Integral Equations
Supervisor: Prof. Shantanu Koley
Year of Conferral : 2023

BITS Pilani
Hyderabad Campus
Department of Mathematics

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