# DHAIRYA SHAH

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## EDUCATION

❑ **Imperial College London, United Kingdom**                                    **10-2022 – 10-2023**
*Master of Science in Applied Mathematics*                                               Grade: Distinction

- Achieved excellence in courses such as Tensor Calculus and General Relativity, Special Relativity and Electromagnetism, Classical Dynamics showcasing a strong foundation in theoretical frameworks essential for advanced studies
- Demonstrated proficiency in Applied Complex Analysis, Quantum Mechanics – I and Vortex Dynamics, underscoring a deep understanding of mathematical principles relevant to theoretical physics
- Other Modules: Numerical Solutions of Ordinary Differential Equations, Methods for Data Science

❑ **Pandit Deendayal Energy University (PDEU), India**                              **07-2017 – 06-2021**
*Bachelor of Science (Hons.)* in Mathematics and *Diploma in Liberal Studies*              CPI: 9.10/10

- Received perfect scores (10/10) in all mathematical modules across eight semesters, setting an unbroken record
- Demonstrated mastery in foundational mathematical physics concepts, including Differential Geometry, Real Analysis, Complex Analysis, and Fluid Mechanics, providing a strong basis for advanced studies in theoretical physics
- Selected Modules: Integral Equations, Integral Transforms, Topology, Special Functions, Differential Equations

## RESEARCH EXPERIENCE

❑ *MSc Thesis:* **Local Solution to Electro-Capillary Phenomenon near Sharp Corner**     **10-2022 – 09-2023**

- Investigated the behaviour of the voltage local to the triple contact point for the Electrowetting phenomenon
- Derived Eigenvalue condition near the triple contact point, demonstrating that the corresponding equipotential lines do not form eddies
- Supervised by Dr Samuel Brzezicki

❑ *BSc Thesis:* **Numerical Methods for Solutions of One Variable Nonlinear Equations**     **07-2019 – 06-2021**

- Categorised methods developed over the last 250 years in four families and devised an analogy for interconversion
- Developed a set of efficient methods in fixed-point family and implemented different methods to solve nonlinear equations
- Showcased the fixed-point family as the most efficient and stable; resulting in a conference proceeding: 1
- Supervised by Dr Manoj Sahni and Dr Ritu Sahni

❑ *BSc Research Collaboration:* Novel Formulae for Series Involving Floor and Ceiling Functions     **06-2019 – 04-2022**

- Formulated and applied two original theorems to derive over 40 novel results pertaining to Floor and Ceiling functions
- Provided generalisations for different finite and infinite series as well as for the cases of Generalized Dirichlet series such as Riemann, Hurwitz, and Lerch Zeta functions; resulting in two published articles (I, II)
- In Collaboration with Dr Manoj Sahni, Dr Ritu Sahni, Dr Ernesto León-Castro and Dr Maricruz Olazabal-Lugo

❑ *BSc Project II:* Applications of the Fuzzy Set Theory                              **01-2018 – 04-2019**

- Derived the solution for second order Cauchy-Euler equation using generalised trapezoidal intuitionistic fuzzy numbers
- Fuzzified generalized Newton Raphson type method to solve one variable equations; resulting in four articles

❑ *BSc Project I:* Fixed Point Theory and Numerical Methods                          **08-2017 – 11-2019**

- Obtained a formula that provides exact number of iterations required based on initial guess for the fixed-point method
- Amalgamated the Fixed-Point and Newton-Raphson method to demonstrate that the integrated methods converge faster than the original pair; resulting in an article and a conference proceeding

*H-index: 3, Citations: 30 (as of October 2024) – google scholar account*

## SELECTED PUBLICATIONS

[1] **D. Shah** et al. "Series of Floor and Ceiling Function—Part I: Partial Summations". *Mathematics* 10.7 (2022), p. 1178. DOI: 10.3390/math10071178.

[2] **D. Shah** et al. "Series of Floor and Ceiling Functions—Part II: Infinite Series". *Mathematics* 10.9 (2022), p. 1566. DOI: 10.3390/math10091566.

[3] M. Sahni, **D. Shah**, and R. Sahni. "A new modified accelerated iterative scheme using amalgamation of fixed point and NR method". *Journal of Interdisciplinary Mathematics* 22.5 (2019), pp. 679–688. DOI: 10.1080/09720502.2019.1649035.

[4] **D. Shah**, M. Sahni, and R. Sahni. "Solution of algebraic and transcendental equations using fuzzified he's iteration formula in terms of triangular fuzzy numbers". *WSEAS Trans. Math* 18 (2019), pp. 91–96. DOI: 10.37394/23206.

[5] **D. Shah** and M. Sahni. "DMS way of finding the optimum number of Iterations for fixed point Iteration method". *Proceedings of the World Congress on Engineering.* Vol. 1. 2018, pp. 87–89. ISBN: 978-988-14047-9-4.

## AWARD AND GRANT

❑ Received **Certificate of Merit (Student)** for the 2018 International Conference of Applied and Engineering Mathematics for the paper entitled "DMS Way of Finding the Optimum Number of Iterations for Fixed Point Iteration Method"

❑ Awarded **Travel Grant** of **65000 INR ≈ £700** in 2018 by Pandit Deendayal Energy University to present a conference paper in the U.K.

## PRESENTATIONS AND DEFENCES

❑ <u>Postgraduate Thesis Defence</u> – *Local Solution to Electro-Capillary Phenomenon near Sharp Corner* **18ᵗʰ Sep 2023**
Department of Mathematics, **Imperial College London, UK**

❑ <u>Postgraduate Poster Presentation</u> – *Complex Analytical Approach to Electrowetting* **26ᵗʰ Jul 2023**
Department of Mathematics, **Imperial College London, UK**

❑ <u>Undergraduate Thesis Defence</u> – *On Numerical Methods for Real Solutions of One Variable Nonlinear Equations* **2ⁿᵈ Jun 2021**
School of Liberal Studies, **Pandit Deendayal Energy University, India**

❑ <u>Conference Presentation</u> – *DMS way of finding the optimum number of iterations for Fixed Point Iteration Method* **5ᵗʰ Jul 2018**
2018 International Conference of Applied and Engineering Mathematics **World Congress on Engineering 2018, London, UK**

## TEACHING EXPERIENCE

❑ **The Charter School North Dulwich**, *Graduate Teaching Assistant (**SEN, Mathematics**)* **09-2024 – Present**
- Supporting SEN students in Mathematics with tailored guidance, collaborating with teachers to adapt resources for individual needs
- Delivering small group instruction to improve comprehension and build confidence in Mathematics for SEN students

❑ **Cardinal Hume Centre, London**, *Homework Club Volunteer (**Mathematics**)* **05-2024 – Present**
- Providing support in using academic resources, assisting with homework, exam preparation, and teaching Mathematics up to GCSE level
- Supporting students in improving numeracy, engaging them with learning activities, and offering guidance with reading educational materials

❑ **Astronomy Club, PDEU**, *Course Facilitator of **Mathematical Aspects of Relativity*** **10-2023 – 12-2023**
- Designed, developed and delivered a 30-hour course on Mathematical Aspects of Relativity to undergraduate students, with focus on Lagrangian and Hamiltonian dynamics as well as advanced topics in Special Relativity
- Applied aforementioned concepts to teach principles such as the conservation of momentum and energy, as well as derivations such as $E = mc^2$, thereby fostering a deeper understanding of concepts of Relativity

❑ **Office of International Relations, PDEU**, *Teacher of **Foundations of Mathematics*** **12-2019 – 03-2020**
- Developed instructional material to reinforce foundational Mathematics skills for twelve international engineering students, achieving a 92% pass rate in subsequent mathematics exams
- Implemented innovative pedagogical methods, including real-world examples and visualization techniques to enhance understanding of fundamentals

❑ **Yusuf Mehrally Centre (NGO), Kutch**, *Teacher of **Science** & **Mathematics*** **12-2018 – 01-2019**
- Taught Mathematics and Science to underprivileged 8th-grade students (UK Year 9 equivalent), tailoring methods to meet the needs of students with special learning requirements, resulting in a 20% increase in exam pass rates
- Demonstrated adaptability and dedication, ensuring higher success rates despite the challenging circumstances faced by the students

## KEY ACADEMIC ENGAGEMENTS

❑ **Department of Mathematics, ICL, UK**, *MSc Programme Representative* **10-2022 – 09-2023**
- Chaired PG Student-Staff Committee meetings, ensuring seamless communication and implementation of key student suggestions and concerns as well as participated in various meetings by university and union staff
- Performed the role of liaison between the MSc cohort and the department, soliciting student feedback and sharing the areas of learning and opportunities appropriately with both parties

❑ **Board of Studies, PDEU**, *Student Representative for the Department of Mathematics* **03-2021**
- Proposed a cohesive course structure for the B.Sc.(Hons.) Mathematics program, in alignment with international standards, which was unanimously accepted and implemented forthwith, receiving appreciation
- Enhanced students' subject proficiency through the suggested course structure, resulting in 80% Mathematics graduates in subsequent years getting offers from top-ranked universities

❑ **Second International Conference on Mathematical Modeling, Computational Intelligence Techniques and Renewable Energy (MMCITRE) - 2021**, *Head, Logistics Committee* **6ᵗʰ to 8ᵗʰ Feb 2021**

**First International Conference MMCITRE - 2020**, *Head, Associate Committee* **21ˢᵗ to 23ʳᵈ Feb 2020**
- Directed associate and logistic committees of 30+ undergraduate and postgraduate students, overseeing hospitality, management, and other key departments in organising both conferences
- Managed a hybrid conference (offline and online) with 120+ presenters and speakers in 2021 and 90+ in 2020, successfully navigating through the challenges posed by the COVID-19 pandemic

## RELEVANT SKILLS

❑ **Proficiency in Programming Languages**: Python, Wolfram Language, C/C++, MATLAB

❑ **Proficiency in Operating Systems & Tools**: Debian Linux, Windows, Git, Github, LaTeX, Google Collabetory, Libre/Microsoft Office