

# 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

## 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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.1080/09720502.2019.1649035).

*H-index: 4, Citations: 33 (as of November 2024) – [google scholar account](#)*

## 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  $\approx$  £700** in 2018 by Pandit Deendayal Energy University to present a conference paper in the U.K.

PRESENTATIONS AND DEFENCES

- ❑ Postgraduate Thesis Defence – *Local Solution to Electro-Capillary Phenomenon near Sharp Corner*

Department of Mathematics, Imperial College London, UK

18<sup>th</sup> Sep 2023
- ❑ Postgraduate Poster Presentation – *Complex Analytical Approach to Electrowetting*

Department of Mathematics, Imperial College London, UK

26<sup>th</sup> Jul 2023
- ❑ Undergraduate Thesis Defence – *On Numerical Methods for Real Solutions of One Variable Nonlinear Equations*

School of Liberal Studies, Pandit Deendayal Energy University, India

2<sup>nd</sup> Jun 2021
- ❑ Conference Presentation – *DMS way of finding the optimum number of iterations for Fixed Point Iteration Method*

2018 International Conference of Applied and Engineering Mathematics World Congress on Engineering 2018, London, UK

5<sup>th</sup> Jul 2018

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 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

6<sup>th</sup> to 8<sup>th</sup> Feb 2021

First International Conference MMCITRE - 2020, Head, Associate Committee

21<sup>st</sup> to 23<sup>rd</sup> 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, L<sup>A</sup>T<sub>E</sub>X, Google Collabotory, Libre/Microsoft Office