ANAM RANI

Professional Summary

Mathematician with a strong academic and applied profile, combining expertise in Algebra, Graph Theory, mathematical modeling, and introductory exposure to machine learning concepts such as Graph Neural Networks. Experienced in university-level teaching, research, problem solving, and mathematical software. Diverse background across academia and applied mathematical research environments.

Research Interests

- Commutative Algebra
- Combinatorial Commutative Algebra
- Algebraic, Chemical & Complex Network Graph Theory
- Mathematical Modeling
- Graph Neural Networks (GNN) and applications in biology & chemistry
- Cryptographic applications of algebra & graph theory

Education

PhD Mathematics — Abdus Salam School of Mathematical Sciences, GC University Lahore (2014–2017)
M.Phil. Mathematics — Abdus Salam School of Mathematical Sciences, GC University Lahore (2012–2014)
MSc Mathematics — Center for Advanced Studies in Pure & Applied Mathematics, BZU Multan (2009–2011)

Publications

- R. Mustafa, F. Khan, A. Farooq, A. Rani, Robust Application of Bayesian Neural Networks to Equilibrium Dispersive Model of Chromatography Using Monte Carlo Simulations, Chromatographia, Accepted (4-12-2025), In press.
- A. Rani, A. Razzaque, Swapped Optical Transpose Interconnection System: Fault-Tolerant Resolvability on Cycle Graphs, AKCE International Journal of Graphs and Combinatorics. Accepted (5-12-2025). In press.
- A. Rani, M. Shams, S. Bokhary, U.Ali, Image Encryption Using Logistic Map and Finite Field Inversion for Dynamic S-Box Design, Journal of Prime Research in Mathematics, 21(2), 120-139 (2025).
- A. Rani, A. Fahad, I.F. Hussain, U. Ali and M. Ashraf, A Comparison between Certain Graphs Parameters of Biswapped Networks and their Maximal Twin Preserving Subgraphs with Applications in Determining Complexity, 35 (2024), 1-24, (2024).
- X. Zhang, M. Salman, A. Rani, R. Tanveer, U. Ali and Z. Shao, Metric Identification of Vertices in Polygonal Cacti, Computer Modeling in Engineering & Sciences, 136(1), 884- 899, (2023).
- U. Ali, I. Hussain, A. Rani, On the Existence of Fault-tolerant Numbers of Two Bridge Knots, Scientific Inquiry and Review, 6(4), 109-131, (2022).
- A. Rani, M. Imran, A. Razzaque and U. Ali, Properties of Total Transformation Graphs for the General Sum-Connectivity Index, Complexity, 2021, 6616056,1-6, (2021).
- A. Rani and U. Ali, Degree-Based Topological Indices of Polysaccharides: Amylose and Blue Starch-Iodine Complex, Journal of Chemistry, 2021, 6652014, 1-10, (2021).
- A. Rani, M. Imran and U. Ali, Sharp Bounds for the Inverse Sum Indeg Index of Graph Operations, Mathematical Problems In Engineering, 2021, 5561033, 1-11, (2021).

- K. Wahid, A. Das, A. Rani, S. Amanat, M. Imran and U. Ali, On Twin Preserving Spanning Subgraphs, Journal of Intelligent & Fuzzy Systems, 40, 9505–9513, (2021).
- G. Abbas, A. Rani, M. Salman, T. Noreen and U. Ali, Hosoya Properties of Commuting Graph Associated with the Group of Symmetries, Main Group Metal Chemistry, 44,173-184, (2021).
- T. Dumitrescu and A. Rani, A Note on Perinormal Domains, Journal of Commutative Algebra, 10(3), 305-315, (2018).
- A. Rani and T. Dumitrescu, Perinormal Rings with Zero Divisors, Journal of Algebra and its Applications, 17(3), 1-10, (2018).
- T. Dumitrescu and A. Rani, Perinormal Polynomial Domains, International Electronic Journal of Algebra, 23, 1850055,153-156, (2018).

Research Grants (PI)

- Degree- based Topological Indices of Polysaccharides: Amylose and Blue Starch Iodine Complex: King Faisal University, Saudi Arabia (2020)
- Sharp Bounds for the Inverse Sum Indeg Index of Graph Operations: King Faisal University, Saudi Arabia (2021)
- Extremal Results on General Sum- Connectivity Index of Total Transformation Graphs: King Faisal University, Saudi Arabia (2021)

Conferences and Workshops

- December 2024: Participant, One day workshop on Outcome –Based Education (OBE) at Bahauddin Zakariya University, Multan, Pakistan.
- November 2025: Participant, One day International Workshop on Generative AI for Higher Education and Research at Bahauddin Zakariya University, Multan, Pakistan.
- May 2025: Participant, 4 day Level 1 Training Program BZU on Academic Planning, Academic Execution, Academic management, Research and Projects, University Ethics and Polices at Bahauddin Zakariya University, Pakistan.
- March 2020: Participant, How to use Pearson for online assessments at King Faisal University, Saudi Arabia.
- March 2020: Participant, Using Blackboard (for online teaching) at King Faisal University, Saudi Arabia.
- August 2020: Participant, Integrating Research into the curriculum at King Faisal University, Saudi Arabia.
- March 2017: Participant as an observer, 4th CASPAM Regional Student Olympiad of Mathematics at BZU, Multan, Pakistan.
- January 2017: Participant, Understanding Salam Event at Abdus Salam School of Mathematical Sciences, GCU Lahore, Pakistan
- April-June, 2016: Visiting student, Simion Stoilow Institute of Mathematics of the Romanian Academy.
- May 2016: Presenter, Seminar Series on Commutative Algebra at the University of Bucharest, Romania.
- Spring, 2014: Participant, Seminar Series on Algebraic Geometry and Sheaf Theory by Prof. Hironori Shiga at Abdus Salam School of Mathematical Sciences, GCU Lahore, Pakistan
- March 2013: Participant, 6th World Conferenceon21st Century Mathematics at Abdus Salam School of Mathematical Sciences, GCU Lahore, Pakistan.

Teaching Experience

- Bahauddin Zakariya University, Multan, Pakistan (2022–present)
- King Faisal University, Saudi Arabia (2019–2022)
- University of Central Punjab, Lahore Pakistan (2017–2019)

Courses Taught

BS Mathematics

Calculus, Linear Algebra and its Applications, Abstract Algebra, Module Theory, Portfolio Theory and Risk Management, Differential Equations, Graph Theory, Statistics-I, Statistics-II, Real Analysis.

BS Data Science:

Discrete Structures

BS Financial Analytics:

Linear Algebra for Finance

Technical & Teaching Skills

- MATLAB, Mathematica, Maple
- LaTeX, Overleaf, MS Office
- Python (basic),
- Blackboard, Moodle, Pearson, MS Teams, Zoom

Languages

- English (Fluent)
- Urdu (Native)
- Arabic (Basic)

Referees

1. Prof. Dr. Norma Alias

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2. Prof. Dr. Azeem Haider

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3. Prof. Dr. Usman Ali

CASPAM, Bahauddin Zakariya University, Pakistan
Tel: 00923339473610
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4. Prof. Dr. Gerhard Pfister

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