

AQSA ZAFAR ABBASI

Nationality: Pakistani  (+92) 3466299824 **Date of birth:** 24/04/1997 **Gender:** Female

 **Email address:** zafariqbalabbasi67@gmail.com

 **Address:** Village dhokedarziyan p/o Sihala Islamabad (Pakistan)

ABOUT ME

I am a dedicated and ambitious individual with a strong desire to excel in a challenging and dynamic environment. My passion lies in utilizing my mathematical knowledge and practical skills to their fullest extent, fostering personal and professional growth. Through a combination of hard work, integrity, and creative thinking, I am committed to achieving exceptional results and leaving a lasting impact in my chosen field.

EDUCATION AND TRAINING PhD Mathematics

PhD Mathematics

Institute of Space Technology Islamabad | (Pakistan [27/09/2021 – 01/07/2025]

Core Subjects: Advance number theory, Finite element method, Newtonian fluid mechanics, Advance engineering mathematics, Astrostatistics, Fractional Calculus, Algebraic Geometry, Heat and Mass transfer.

CGPA: 3.5/4.0

Title: “Parametric Exploration of Homomorphisms of Modular Group for Finite Generalized Triangle Groups”

Description: This research program is based on three sections:

1. The parameterization of homomorphisms of modular group, for all the finite generalized triangle groups using the properties of triangle groups and their associated Schreier coset graphs.
2. Construction of Highly secured Substitution Boxes and its application.
3. Neural Networks incorporated in encryption scheme to make it more strong.

Our main aim is to cover complete list of finite generalized triangle groups for parameterization of modular group homomorphisms. Our objective extends to use these algebraic structures to create a robust highly nonlinear substitution boxes for different applications including image, audio and video encryption. By using the parameterization of generalized triangle groups and considering the relevant group action of the modular group on the projective line over finite fields, we seek to enhance the security of symmetric cryptographic techniques by fortifying the nonlinear component, thus ensuring more robust data protection measures. This research program takes an interdisciplinary approach, with the goal of improving existing encryption schemes strong by incorporating neural networks with algebraic structures.

MS Mathematics (18 years Education)

Institute of Space Technology Islamabad | (Pakistan [09/2019 – 09/2021]

Core Subjects: Numerical Solutions of PDEs (I, II), Cryptography, Advance numerical techniques, Graph Theory Group Actions, Mathematical Physics, Nonlinear Dynamics, Advance PDEs.

Final CGPA: 3.3/4.0

Thesis Title: “Some Algebraic Characteristics of Bipolar Valued Fuzzy subgroups and its Applications in Decision Making and Analysis of S-Boxes”

Description: The aim of our work is to “study some algebraic characteristics of BVFSGs and its applications in decision making, and analysis of S-boxes”. We introduce the concept of “ ψ -Bipolar-Valued Fuzzy Set” (ψ BVFS), “ ψ -BipolarValued Fuzzy Normal Subgroup” (ψ -BVFNSG), (ζ, ν) cut sets $C_{\zeta, \nu}$ of BVFS, ψ -BVFSG, and

Bipolar-Valued Fuzzy cosets (BVF cosets). The motive is to explore some algebraic properties of BipolarValued Fuzzy Subgroup (BVFSG) over cut set and newly defined ψ -BVFSG. In addition, we present some new results of homomorphism and quotient group of ψ -BVFSG. An application of ψ -BVFS in decision making by use of TOPSIS method is elaborated as well. The ideology of BVFSG is extended by generating results related to homomorphisms of BVFSG with respect to $C_{\zeta, \nu}$. We also

extend the theory of Bipolar-Valued Q-fuzzy subgroup by apply (T,S) norms on it and generated results related to this ideology. An application of BVFS in analysis of S-boxes TOPSIS method has been elaborated as well.

MSc Mathematics (16 years Education)

PMAS Arid Agriculture University Rawalpindi | Pakistan. [10/2017 – 07/2019]

Final CGPA: 3.7/4.0

PUBLICATIONS

-
- **Abbasi, A. Z.,** Rafiq, A., Alshammari, B. M., & Jaghdam, I. H. (2025). Advanced image encryption scheme based on generalized triangle group and neural networks. *Ain Shams Engineering Journal*, 16(8), 103488.
 - **Abbasi, A. Z.,** Aamir, M., Sattar, M., Abdullah, N., Abdennaji, T. S., Alshammri, B. M., & Kolsi, L. (2025). Modelling and Prediction of 3D Carreau Fluid Behaviour Using Machine Learning for Cattaneo Christov Double Diffusion with Variable Conductivity. *Case Studies in Thermal Engineering*, 106302.
 - Maria, **Abbasi, A. Z.,** Raja, M. A. Z., Nisar, K. S., & Shoaib, M. (2025). A Novel Caputo Fractional Model for English Language Learning: Analysis and Simulation with Bayesian Regularization Approach. *MethodsX*, 103375.
 - Raja, M. A. Z., **Abbasi, A. Z.,** Nisar, K. S., Rafiq, A., & Shoaib, M. (2025). A Design of Predictive Intelligent Networks for the Analysis of Fractional Model of TB-Virus. *CMES-COMPUTER MODELING IN ENGINEERING & SCIENCES*.
 - **Abbasi, A. Z.,** Rafiq, A., Ishtiaq, U., Saqib, S., & Sessa, S. (2025). Some Algebraic Characteristics of BipolarValued Fuzzy Subgroups over a Certain Averaging Operator and Its Application in Multi-Criteria Decision Making. *International Journal of Analysis and Applications*, 23, 54-54.
 - Aamir, M., Alshehery, S., **Abbasi, A. Z.,** Sohail, M. U., Khan, N., Mesloub, A., ... & Kolsi, L. (2025). Analysis for 3D thermal conducting micropolar nanofluid via artificial neural network. *The European Physical Journal Plus*, 140(2), 1-26.
 - **Abbasi, A. Z.,** Rafiq, A., & Alshammari, B. M. (2025). A digital audio data protection method using parametric action of generalised triangle group on 2^8 . *Ain Shams Engineering Journal*, 16(1), 103193.
 - **Abbasi, A. Z.,** Rafiq, A., & Kolsi, L. (2024). Parametrization of generalised triangle groups and construction of substitution box for medical image encryption. *Journal of King Saud University-Computer and Information Sciences*, 102159.
 - Nisar, K. S., Aamir, M., **Abbasi, A. Z.,** Raja, M. A. Z., Sohail, M. U., & Shoaib, M. (2024). Comparative analysis of compressible inviscid flow over symmetric and supercritical airfoil. *Results in Physics*, 107830.
 - Shoaib, M., Nisar, K. S., Raja, M. A. Z., **Abbasi, A. Z.,** Tabassum, R., & Rafiq, A. (2023). Stochastic numerical computing for hydro-magnetic flow of Carreau-nanofluid model. *Waves in Random and Complex Media*, 1-20.
 - Shoaib, M., Shah, F. A., Nisar, K. S., Raja, M. A. Z., ul Haq, E., **Abbasi, A. Z.,** ... & Abdel-Aty, A. H. (2023). Variational iteration method along with intelligent computing system for the radiated flow of electrically conductive viscous fluid through porous medium. *Heliyon*, 9(3).
 - Shoaib, M., **Abbasi, A. Z.,** Raja, M. A. Z., Nisar, K. S., & Rafiq, A. (2023). Neuro-computing intelligent networks to analyze Casson nanofluid flow over a curved stretching surface. *Waves in Random and Complex Media*, 120.

- Shoaib, M., **Abbasi, A. Z.**, Raja, M. A. Z., & Nisar, K. S. (2022). A design of predictive computational network for the analysis of fractional epidemical predictor-prey model. *Chaos, Solitons & Fractals*, 165, 112812.
- **Abbasi, A. Z.**, Rafiq, A. (2025). A Novel Video Encryption Method Using Parametrization of Generalized Triangle Groups (under review)
- **Abbasi, A. Z.**, Rafiq, A. (2025). Design of Nonlinear Component of Block Cipher based on Actions of the Group with RGB Image Encryption. *Multimedia tools and applications* (under review)
- **Abbasi, A. Z.**, Fattakh, A., Rafiq, A. Medhit, S. (2025). A Novel Approach of Image Encryption based on Triangle group and Chaotic Maps (under review)
- Aamir, M., **Abbasi, A. Z.**, (2025). CFD Analysis on triple Slotted Flaps Wing of NACA-2412 and it's comparison with machine learning prediction. *Scientific reports* (Under review)
- **Abbasi, A. Z.**, Nawaz, A., Medhit, S., Rafiq, A., (2025) Modelling and Analysis of HIV dynamical model with Fractal-Fractional Order and Nonlinear Autoregressive Neural Networks. *Neuro Computing* (Under review)

And so on.

WORK EXPERIENCE

Total six years' experience of Mathematics and Statistics (O, A level and bachelors level).

Lecturer (Visiting Faculty)

Pir Mehr Ali Shah Arid Agriculture University Rawalpindi | (Main Campus) Pakistan [25/09/2023 –10/07/2024]

- Differential Equations in department of Mathematics (BS Mathematics).

Lecturer (Visiting Faculty)

National Defence University, Islamabad | Pakistan [26/02/2024 – 10/07/2024]

- Mathematics II (BS LMS).

Lecturer (Visiting Faculty)

Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology (SZABIST), Islamabad | (Islamabad Campus) Pakistan [18/10/2021 – continue]

- Linear algebra, Discrete Mathematics and Calculus in Computer science department (BS software engineering and BS computer science).

Lecturer (Visiting Faculty)

Institute of Space Technology (IST), Islamabad | (Islamabad Campus) Pakistan [10/02/2022 – 30/06/2023]

- Differential equations, Graph theory, Discrete mathematics, Engineering mathematics and Real analysis in different departments.

Seminar and Workshop

1. Research Methodology

2. Seminar on machine learning.
3. Participated in workshop of Python in IST.

Languages

1. Urdu
2. English

DIGITAL SKILLS

Microsoft Office / Good knowledge in programming in C++ / Proficient User of MATLAB / Team-work oriented / Good familiarity with R/ Wolfram Mathematica / Computational Intelligence / Python

SKILLS

Speaking Skills, Creative Writing, Editing, Proofreading, Research Work, Lesson Planning, Classroom Management, Team Working, Communication and Leadership Skills, Seminar Organizing, Event Management.