



Huma Umbreen

📍 **Work** : Cryptography Lab, Department of Mathematics, Quaid-i-Azam University ,
45320, Islamabad, Pakistan

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Date of birth: 06/08/1998 **Nationality**: Pakistani

WORK EXPERIENCE

Department of Mathematics, Quaid-i-Azam University

City: Islamabad | **Country**: Pakistan

[04/09/2023 – Current] **Research Associate**

A dynamic and committed researcher with a core specialization in the domains of cryptography

Responsibilities

- To work collaborating closely with the principal investigator and collaborators on research projects
- To prepare material for presentation in oral and poster formats
- To draft publications for submission to peer-reviewed journals
- To undertake instruction to MS students as required
- Teaching Assistant

Department of Bioinformatics, Quaid-i-Azam University

City: Islamabad | **Country**: Pakistan

[18/02/2025 – Current] **Visiting lecturer**

I taught a 4-credit hour course on Modeling and Simulation in Spring 2025, which includes both theory and practical lab sessions. In the lab class, I guide students on how to perform simulations using MATLAB and Simulink software.

I am currently teaching a course "Calculus & Analytical Geometry" in Fall 2025.

EDUCATION AND TRAINING

[05/10/2023 – Current] **PhD in Mathematics**

Quaid-i-Azam University <https://qau.edu.pk/>

City: Islamabad, 45320 Islamabad | **Country**: Pakistan

Supervisor: Dr. Zia Bashir

Synopsis Title:

Group theoretic and Ring Structures: Cryptographic Design and Applications to Multimedia Data Security

PhD Major Courses:

Machine Learning, Dynamical Systems and Chaos, Banach Algebra, Group Actions, Linear Optimization

[05/09/2021 – 07/12/2023] **Master of Philosophy in Mathematics**

Quaid-i-Azam University <https://qau.edu.pk/>

City: Islamabad, 45320 Islamabad | **Country**: Pakistan | **Field(s) of study**: Mathematics | **Final grade**: 3.6/4 | **Thesis**: S-boxes Construction over a Commutative Finite Chain Ring $F_2[x]/\langle x^{10} \rangle$ and RGB Image Encryption

In this research, we utilized the chain ring structure $F_2[x]/\langle x^{10} \rangle$ with a cardinality of 1024 to construct four highly non-linear S-boxes. These were generated by uniquely projecting the chain ring elements onto $GF(2^8)$ and subsequently applied to RGB image encryption. To evaluate the proposed encryption method, we conducted a comprehensive set of tests, including statistical, security, entropy, energy, correlation, contrast, noise, occlusion, and differential analyses. The results demonstrate the robustness and effectiveness of our approach in achieving secure image encryption.

[09/10/2017 – 11/08/2021]

Bachelors of Mathematics

University of Education | <https://www.ue.edu.pk/index.php>

City: Lahore, Lahore College Road, 54000 | **Country:** Pakistan | **Field(s) of study:** Natural sciences, mathematics, and statistics | **Final grade:** 3.62/4 | **Thesis:** Super Edge-Magic Total Labeling on some Tree Structure Graphs

PUBLICATIONS

[2025] [Designing nonlinear component of block cipher over finite chain ring and RGB image encryption](#)

Journal Name: Multimedia Tools and Applications

[2025] **A Hybrid Image Encryption Technique Based on the Chaotic Tent Map and Non-Chain Ring S-Box [under process]**

[2024] **An S-box Design Based on Finite Chain Ring and Symmetric Group; Application in RGB Image Encryption [under process]**

DIPLOMA/ TRAINING

[01/08/2018 – 31/07/2019]

Diploma Information Technology

It was a one-year course focused on developing various computer-based skills. I successfully completed it with a score of 970 out of 1200 in the final exam, earning an A grade.

HONOURS AND AWARDS

[05/09/2021] **QAU Merit Fellowship Awarding institution:** Quaid-i-Azam University, Islamabad

• Granted fellowship for outstanding performance throughout my M.Phil. studies.

[09/10/2017] **UOE Merit Scholarship Awarding institution:** University of Education Lahore

• Granted scholarship for outstanding performance in the four years of BS studies.

SKILLS

Digital Skills

Matlab/Simulink | Python Language | C Language | Microsoft Office

RECOMMENDATIONS

Name: Dr. Tariq Shah | Professor

Employer: Professor Department of Mathematics, Quaid-i-Azam University, Islamabad

Phone number: (+92) 3335072554 | **Email:** stariqshah@gmail.com

Name: Dr. Zia Bashir | Associate Professor

Employer: Associate Professor, Department of Mathematics, Quaid-i-Azam University, Islamabad

Email: zbashir@qau.edu.pk