



# Dr. MUHAMMAD AYAZ

## ASSOCIATE PROFESSOR

### DEPARTMENT OF MATHEMATICS, UNIVERSITY OF KARACHI

## CONTACT

- +923333237952
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University of Karachi
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## FIELD OF INTEREST

- NEURAL NETWORK,
- ALGEBRA,
- STOCHASTIC MODELING,
- FRACTIONAL DERIVATIVES,
- ENVIRONMENTAL MODELLING.

## SKILLS

- Project Management
- Public Relations
- Teamwork
- Time Management
- Leadership
- Effective Communication
- Critical Thinking

## LANGUAGES

- English (Basic)
- Urdu (Fluent)

## OBJECTIVES

My objectives balance advancing the discipline through research, shaping future Mathematicians via education, and strengthening institution and societal connection through service.

## ACADEMIC QUALIFICATION

<b>PHD IN MATHEMATICS</b>	University of Karachi	2018
<ul style="list-style-type: none"><li>Title of thesis "The development of Mathematical model in the applied sciences with reference to Environmental quantification of Coastal water".</li></ul>		
<b>MS IN INFORMATION TECHNOLOGY</b>	PIMSAT	2007
<ul style="list-style-type: none"><li>Create and manage the marketing budget, ensuring efficient allocation of resources and optimizing ROI.</li></ul>		
<b>M.SC IN MATHEMATICS</b>	University of Karachi	2005
<ul style="list-style-type: none"><li>Applied Mathematics</li><li>with "Operation Research and Projective Geometry"</li></ul>		
<b>B.SC (HONS) IN MATHEMATICS</b>	University of Karachi	2004
<ul style="list-style-type: none"><li>with " statistics and Physics"</li></ul>		
<b>HSC (GENERAL SCIENCE)</b>	Karachi Board	2001
<ul style="list-style-type: none"><li>Physics, Computer Science and Mathematics</li></ul>		
<b>SSC (COMPUTER SCIENCE)</b>	Karachi Board	1999
<ul style="list-style-type: none"><li>Physics, Computer Science, Chemistry and Mathematics</li></ul>		

## ADMINISTRATIVE EXPERIENCE

- EXAMINATION COORDINATOR** 1<sup>st</sup> September 2006 - 30<sup>th</sup> June 2012  
I.T Program, Department of Mathematics, University of Karachi



## CO CURRICULUM ACTIVITY



## TEACHING EXPERIENCE

- **ASSOCIATE PROFESSOR** 04<sup>TH</sup> APRIL, 2023 - PRESENT  
Department of Mathematics, University of Karachi
- **ASSISTANT PROFESSOR** 10<sup>TH</sup> MARCH, 2014 - 03<sup>TH</sup> APRIL 2023  
Department of Mathematics, University of Karachi
- **LECTURER** 10<sup>th</sup> July, 2012 - 09<sup>th</sup> March, 2014  
Department of Mathematics, University of Karachi
- **COOPERATIVE LECTURER** 01<sup>st</sup> September 2006 - 30<sup>th</sup> June 2012  
Department of Mathematics, University of Karachi

## MEMBERSHIP(S) HELD IN BOARDS, COMMITTEE, AND ORGANIZATIONS

- National Advisory Board (Editorial team), The Al Khwarizmi Journal of Science and Humanities
- ERP Program, University of Karachi (Ex-member)
- Board of Faculty of Science, University of Karachi.
- Board of Studies, Department of Mathematics, University of Karachi.
- The Processing Analytical Technology in Preparing the COCIS Programs Review for Effectiveness and Enhancement (June 2025),  
Karachi Institute of Economics and Technology, Karachi

## ADDITIONAL ASSIGNMENT

- Student Advisor, Department of Mathematics, University of Karachi
- Member Renovation Committee, Department of Mathematics, University of Karachi.
- Member Computational Mathematics Syllabus committee, Department of Mathematics, University of Karachi

## EDITOR

- Newsletter, Issue-1 (2017), Department of Mathematics, University of Karachi, Karachi.

## RESEARCH GRANTS AND PROJECTS

- Project title "Priorization of Devastating Disease Preventing strategies via multi-criteria Decision Making in Uncertain environment", Dean Research Grant 2021-2022, Rs 150,000/=, Faculty of Science, UoK.
- Project title "Forecasting of heavy metals contamination in Coastal Sea Surface Water of the Karachi Harbor area using Neural Network" Dean Research Grant 2019-2020, Rs 50,000/=, Faculty of Science, UoK.
- Project title "Numerical Simulation of Non Linear Problem" Dean Research Grant 2017-2018, Rs 100,000/=, Faculty of Science, UoK.
- Project title "A Numerical Comparison for Fractional Order Lotka-Volterra Equations" Dean Research Grant 2013-2014, Rs 100,000/=, Faculty of Science, UoK.



## GOOGLE SCHOLARS



Citation 246

h-index 8

i10-index 7

## RESEARCH GATE



Citations 214

h-index 8

Research interest score 279.8

## WEB OF SCIENCE



Citations 100

h-index 5

ID: HTR-0237-2023

## ORCID



ID:

0009000923029379

## SCOPUS



Citations: 163

h-index: 7

ID: 8773170600

## TOTAL IMPACT FACTOR

36

## QUARTILE

Q1: Nine      Q2: Four

Q3: Two      Q4: One

## RESEARCH PUBLICATIONS

1. "Multidirectional Chaos-Based Encryption Scheme Using ABC Fractional Derivative for Secure Multimedia Data Transmission", **Mathematical Modelling and Control. (Accepted 23 July, 2025)**
2. "Integrating fractional-order SEI1I2I3QCR model with awareness and non-pharmaceutical interventions for optimal COVID-19 pandemic", **BMC Medical Research Methodology**. 25:49, 2025, 1-32.
3. "Haar wavelet arctic puffin optimization method (HWAPOM): Application to logistic models with fractal-fraction Caputo-Fbrizio operator" **Partial Differential equations in applied sciences**.13, 2025, 1- 9.
4. "Mathematical modeling and dynamics of immunological exhaustion caused by measles transmissibility interaction with HIV host" **Ploseone**. 19(4), 2023, 01-26.
5. "Global dynamics and Impact of Gaussian noise intensity on the stochastic epidemic model with local fractional derivatives" **Physica Scripta**, 98(6), 2023, 1402-4896.
6. "Rational approximation with Cuckoo Search Algorithm for Multifarioua Painleve Type Differential Equations" **Ain Shams Engineering Journal**. 11, 2020, 179-190.
7. "Economic Growth By Means Of Interspecific Functional Response Of Capital-Labour In Dynamical System" **International Journal of Analysis and Applications**. 17(4), 2020, 630-651.
8. "Forecasting of heavy metals contamination in coastal sea surface water of the Karachi harbor area using neural network approach" **Nature Environment and Pollution Technology**. 18 (3), 2019.
9. "Dimerization: A Resourceful Slant Applied On The Fractional Partial Differential Equation". **Thermal Science: International Scientific Journal**. 23(6), 2019, S2095-S2105
10. "Intelligent computing for Duffing-Harmonic oscillator equation via the bio-evolutionary optimization algorithm" **Journal of Low Frequency Noise Vibration and Active Control** 38 January 2019
11. "Tracking the chaotic behaviour of fractional-order Chua's system by Mexican hat wavelet-based artificial neural network" **Journal of Low Frequency Noise Vibration and Active Control** 38 January 2019.
12. "Accurate numerical approximation of nonlinear fourth order Emden-Fowler type equations: A Haar based wavelet-collocation approach" **Waves Wavelet Fractals Adv. Anal.** 3, 2017,75-83
13. "Notes on fuzzy fractional Sumudu transform" **J. Math. Computer Sci.**, 18 (2018), 63-73.
14. "some properties and applications of conformable fractional laplace transform (cflft)" **Journal of fractional calculus and application**, Vol. 9 (1). 2018, 72-81.
15. "Numerical Scheme for Global Optimization of Fractional Optimal Control Problem with Boundary Conditions". **International journal of innovative computing, information & control: IJICIC** 13(5): October 2017, 1669- 1679 .
16. "On the solution of fuzzy differential equations by Fuzzy Sumudu Transform" **Non-linear engineering modeling and application**, volume 4, Issue 1. March 2015.



## RESEARCH COLLABORATORS

- Dr. Najeeb Alam Khan
- Dr. Oyoon Razzak
- Dr. Tooba Hameed
- Dr. Nasir Uddin Khan
- Dr. Noor Fatima Siddiqui
- Dr. Dilber Uzun Ozsahin
- Dr. Maged F. Alotaibi
- Dr. Hijaz Ahmed
- Dr. Ahmed rafaie Ali
- Dr. Nadeem alam khan
- Dr. Asmat Ara
- Dr. Samreen Ahmed
- Dr. Lin Jln
- Dr. Ahmet Yildirim
- Dr. Amir Mehmood
- Dr. Javed Ahmed S
- Mr. Danial Ur Rehman
- Ms Sahar Altaf
- Ms. Amber Sheikh
- Ms. Noor Ul Ain
- Ms. Areeba Azam Bajwa

## RESEARCH PUBLICATIONS

17. "A Numerical Comparison for Fractional Order Lotka-Volterra Equations" *World Applied Sciences Journal* 122240-2246, 2011 ISSN 1818-4952.
18. "Numerical study of time fractional fourth-order differential equations with variable coefficients" *Journal of King Saud University - Science*, 23(1),2011,91-99.
19. "Analytical methods for solving the time-fractional Swift-Hohenberg (S-H) equation" *Computers & Mathematics with Applications*, 61(8), April 2011, 2182-2185.
20. "On approximate solutions for the time-fractional reaction-diffusion equation of Fisher type" *International Journal of the Physical Sciences* Vol. 6(10), 2011(May),2483-2496.

## CONFERENCES/SEMINARS/WORKSHOPS /PRESENTATION/LECTURE

### ORGANIZED

- 1."International conference on marine biodiversity, Socio-environmental aspects & technology", April 28th - 30th, 2025, University of Karachi. **(Joint Secretary)**
- 2."international conference on information science and communication Technology" April 15th - 16<sup>th</sup>, 2025, UBIT, University of Karachi.
- 3."Blockchain and Decentralized technologies" 11th March 2025, Department of Mathematics, University of Karachi with collaboration of QEC department, KIET university, Karachi.
- 4."Design thinking for innovation" 15th August 2023, Department of Mathematics, University of Karachi, Karachi.
- 5."International conference on Mathematical Sciences" 2nd - 3rd Nov 2022, Department of Mathematics, University of Karachi, Karachi.
- 6.Seminar on "Spreading Financial Literacy" 14th Oct 2021, department of computer Science, University of Karachi.
- 7.Workshop on "Mathematical Model of Fluid: Methods & Applications"28th to 30th August 2017, Department of Mathematics, University of Karachi, Karachi.
- 8.Lecture series I on "Algebraic fundamentals of error correcting codes and cryptography"4th to 7thjuly 2017, Department of Mathematics, University of Karachi, Karachi.
- 9.Arfa Karim Memorial workshop use of Technology in Math Education.19th to 22nd March 2012 Department of Mathematical Sciences, University of Karachi, Karachi.
- 10.First National Conference on Mathematical sciences.22 March 2010 Department of Mathematics, University of Karachi, Karachi.
- 11.Use of information and Communication Technology in Political Science.9th to 20th March 2010 Department of Political Science, University of Karachi, Karachi.



# CONFERENCES/SEMINARS/WORKSHOPS /PRESENTATION/LECTURE

## PRESENTED

1. Muhammad Ayaz, "Predictive model of heavy metals in surface water quality along Karachi coastal area by using artificial neural network" International conference on marine biodiversity, Socio-environmental aspects & technology, April 28 – 30<sup>th</sup>, 2025, University of Karachi.
2. Lecture on "How Mathematical model help researchers to ease their research in IT field" 14<sup>th</sup> Sep 2023, ILMA University main campus, Karachi.
3. Lecture on "Uses of Mathematical tools and software's in Business Mathematics" KASB Institute of Technology, North Nazimabad campus, 06<sup>th</sup> June 2023.
4. Asif Mansoor, Nasiruddin khan, Mushtaq Hussain, Muhammad Ayaz "Urbanization Growth Dynamic Model of Metropolitan city Karachi." 2nd International Conference on built Environmental in developing countries. 03-04 December 2008 University of SAINS MALAYSIA. <http://eprints.usm.my/34812/>
5. Muhammad Ayaz, Nasiruddin khan, Asif Mansoor. "A Quantitative approach of gases exchange by an open sewer channel" LUMS 2nd International conference on Mathematics and its Application in information technology. March 09-12 2008 GC University Lahore Pakistan.

## ATTENDED

1. Workshop on "Data Analysis on PLS – SEM via SMARTPLS" 14 December 2022, Institute of Business Management, Karachi.
2. Workshop on "Faculty development workshop" 28<sup>th</sup> - 29<sup>th</sup> Nov 2022, Department of computer Science, University of Karachi.
3. Workshop on "Artificial Intelligence in health and Sciences" 20<sup>th</sup> Dec 2021, Centre for Artificial Intelligence in Health sciences, International centre for chemical and Biological Sciences. University of Karachi.
4. First international conference on information science and Communication Technology 2019 9<sup>th</sup> – 10<sup>th</sup> March 2019, Professor Salim uz zaman Siddiqui auditorium, (ICBS), University of Karachi. Karachi.
5. 5<sup>th</sup> National Conference on Space sciences and technology (NCSST-2017). 9<sup>th</sup> - 10<sup>th</sup> October 2017, Institute of Space and Planetary Astrophysics, University of Karachi, Karachi.
6. Workshop on "Awareness in Scientific writing" 24<sup>th</sup> February 2016, Department of Mathematics, University of Karachi, Karachi.
7. The First Conference on Anthromathematics in the memory of (Late) Syed Firdous. 4<sup>th</sup> to 5<sup>th</sup> September 2013 Department of Mathematics, University of Karachi, Karachi.
8. First National Conference on Space sciences. 8<sup>th</sup> to 9<sup>th</sup> October 2012, Institute of Space and Planetary Astrophysics, University of Karachi, Karachi.

## SOME GLIMPSES OF 2025 EVENTS





## M.PHIL / PH.D RESEARCHERS UNDER MY SUPERVISION

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1. Muhammad Usman Qureshi, M.Phil thesis title: "CRYPTOCURRENCIES THROUGH THE LENS OF MATHEMATICS: THEIR INTRINSIC VALUATION VIA CRYPTOGRAPHY", in progress.
2. Areeba Azam Bajwa, M.Phil thesis title: "GLOBAL DYNAMICS AND IMPACT OF GAUSSIAN NOISE INTENSITY ON THE STOCHASTIC EPIDEMIC MODEL WITH LOCAL FRACTIONAL DERIVATIVE", completed in 2024.
3. Noor-Ul-Ain, M.Phil thesis title: "NONLINEAR DYNAMICAL SYSTEM FOR ECONOMIC GROWTH: STABILITY ANALYSIS AND SIMULATIONS", Completed in 2023.

## TEACHING IN M.PHIL PH.D, M.PHIL, UNDERGRADUATE AND POST-GRADUATE MATHEMATICS/COMPUTER SCIENCE/I.T COURSE/ PH.D RESEARCHERS UNDER MY SUPERVISION

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1. Research Methodology
2. Financial Modeling and Simulaton
3. Linear Algebra
4. Applied Algebra
5. Calculus and Algebra
6. Data Structure and Programming
7. Pre-Calculus
8. Research Methodology
9. Operation Research
10. Geometry and Mechanics
11. Discrete Mathematics
12. C-Programming
13. Business Mathematics
14. Discrete Mathematic
15. Multivariate Calculus

## REFERENCES

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### DR. NAJEEB ALAM KHAN

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### DR. NASIR UDDIN KHAN

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