

# **LAHORE SCHOOL OF ECONOMICS**

## **RESEARCH 2024-2025**

DEPARTMENT OF MATHEMATICS & STATISTICAL  
SCIENCES

## RESEARCH OUTPUT

<b>CATEGORY</b>	<b>2023</b>	<b>2024 (Actual)</b>	<b>2025 (On- going)</b>
HEC W Category/Impact Factor Journal Articles	8	12	16
HEC X and Y Category Journal Articles	5	4	3
ABDC/ABS/ MLA Journal Articles			
Books	1	1	2
Book Chapters	1	1	1
National Conference Papers		1	1
International Conference Papers			
Case Studies			
Lahore School Working Papers / International Working Papers	3	2	
Artistic productions (catalogued)		2	1
MS Research Projects Supervised			
MPhil Theses supervised (Completed)			
MPhil Theses supervised (On-going)			
PhD Theses supervised (Completed)			
PhD Theses supervised (On-going)			

## RESEARCH PUBLICATIONS (ACTUAL & ON-GOING)

**Actual 2024 (Author/s, Title of Publication, Journal, Year)**

### HEC W Category/Impact Factor Journal Articles

1. Beg, I., & Eroglu, I. (2024). Fixed point of multivalued maps on bicomplete partially ordered quasi-metric spaces. *Discussiones Mathematicae Differential Inclusions, Control and Optimization*, 44, 167-184.
2. Beg, I., Eroglu, I., & Valero, O. (2024). Fixed points on partially ordered quasi-metric spaces. *Fixed Point Theory*, 25(2), 473-494.
3. Beg, I., Gnanaprakasam, A. J., & Mani, G. (2024). Fixed point on complex partial b-metric spaces with application to a system of Urysohn type integral equations. *Novi Sad Journal of Mathematics*, 54(1), 29-39.
4. Bisht, M., Beg, I., & Rawat, S. (2024). A new method to solve matrix game with interval payoffs and its MATLAB code. *International Game Theory Review*, 26(3), Article 2450001.
5. Iuga, I. C., Mudakkar, S. R., & Dragolea, L. L. (2024). Agricultural commodities market reaction to COVID-19. *Research in International Business and Finance*, 69, 102287.
6. Kara, A. H., Naseer, S., Raza, A., & Zaman, F. D. (2024). Optimal system and conservation laws for the generalized Fisher equation in cylindrical coordinates. *Quaestiones Mathematicae*, 47(7), 1369-1386.
7. Naz, R., & Torrisi, M. (2024). The closed-form solutions of a SIS epidemic reaction diffusion model with advection in a one-dimensional space domain. *Symmetry*, 16(8), 948.
8. Naz, R., Johnpillai, A., & Mahomed, F. M. (2024). The exact solutions of a diffusive SIR model via symmetry groups. *Journal of Mathematics*, 2024, Article ID 4598831, 1-14.
9. Rajput, L., Beg, I., & Kumar, S. (2024). Spherical fuzzy analytic hierarchy process and linear assignment model based MCGDM method with its application in ranking of states for their business climate. *Expert Systems with Applications*, 238, 122247.
10. Raza, A., Kara, A. H., & Alqurashi, B. M. (2024). Double reduction via invariance & conservation laws and analysis of solitons of the Gerdjikov–Ivanov equation in optics. *Journal of Optics*.
11. Shabbir, M., Chand, S., & Iqbal, F. (2024). A novel hybrid approach based on outlier and error correction methods to predict river discharge using meteorological variables. *Environmental and Ecological Statistics*, 1-28.
12. Wasim, D., Suhail, M., Albalawi, O., & Shabbir, M. (2024). Weighted penalized m-estimators in robust ridge regression: An application to gasoline consumption data. *Journal of Statistical Computation and Simulation*, 94(15), 3427-3456.

## **HEC X and Y Category Journal Articles**

1. Beg, I., Roy, K., & Saha, M. (2024). SJS-metric spaces: A survey. *Journal of Nonlinear Science and Applications*, 17(1), 30-69.
2. Naz, R., Oname, A., & Torrisi, M. (2024). Cost-effectiveness analysis of COVID-19 vaccination: A review of some vaccination models. *Partial Differential Equations in Applied Mathematics*, 11, 100842, 1-9.
3. Rashid, T., Mahboob, A., & Beg, I. (2024). A novel technique for solving the uncertainty under the environment of neutrosophic theory of choice. *Transactions on Fuzzy Sets and Systems*, 3(1), 1-14.
4. Raza, A., & Kara, A. H. (2024). Investigating invariance and conservation laws for the classes of nonlinear parabolic and wave systems. *Partial Differential Equations in Applied Mathematics*, 11, 100749.

## **Books**

1. Ayesha Ali, *Kanray ki Riwayat (Urdu)* Lahore School of Economics Press, July 2024.

## **Book Chapters**

1. Beg, I., Book chapter; Interval-valued intuitionistic hesitant uncertain linguistic set and Choquet integral based TOPSIS method to MCGDM problems, Book Chapter in *Decision Making and Decision Support in the Information and AI Era - Dedicated to Academician Florin Gheorghe Filip* (Edited by Valentina Emilia Balas, Gintautas Dzemyda, Smaranda Belciug and Janusz Kacprzyk) *Studies in Systems, Decision and Control (SSDC)* 534. Publisher Springer 2024 (co-authors D.K. Joshi and S. Kumar) [https://doi.org/10.1007/978-3-031-62158-1\\_18](https://doi.org/10.1007/978-3-031-62158-1_18).

## **National Conference Papers**

1. Ayesha Ali, *The Mathematical door to South Asian Music*, APMC magazine 2024.

## **Lahore School Working Papers / International Working Papers**

1. Naz, N. & Mudakkar, S. R. Addressing COVID-19: Understanding Social Vulnerability and Adaptation Strategies through National Population Insights
2. Naz, N., & Mudakkar, S. R. Immigration Policies and Social Well-being—A Multilevel Investigation.

## **Artistic productions (catalogued)**

1. Ali, A. All Pakistan Music Conference, Raag performance, Annual 2024 held November 1st
2. Ali, A. The Second Floor T2F, Karachi, Classical Music Performance, September 2024

**HEC W Category/Impact Factor Journal Articles**

1. Beg, I., & Eroglu, I. (2025). Enriched rational type contractions in quasi-Banach spaces and modified convex b-metric spaces. *Applied General Topology*. (in press)
2. Beg, I., Abbas, M., & Asghar, M. W. (2025). Multi-entropy analysis for mega project contractor selection in q-rung orthopair fuzzy soft set framework. *Computational and Applied Mathematics*, 44, Article 152.
3. Chaudhry, A., & Naz, R. (2025). The closed-form solutions for a model with technology diffusion via Lie symmetries. *Discrete and Continuous Dynamical Systems – S*, 18(4), 1036–1053. <https://doi.org/10.3934/dcdss.2024133>
4. Iuga, I. C., Mudakkar, S. R., & Dragolea, L. L., Digitalization and Future Money Supply Dynamics. (Under Revision)
5. Naz, R. Wang, G. Irum, S., (2025). The closed-form solutions of a diffusive Susceptible Infectious-Susceptible epidemic model, *Journal of Applied Analysis and Computation*, 15 (1), 574-586
6. Naz, R., Johnpillai, A., Mahomed, F. M., & Oname, A. (n.d.). Closed-form solutions for a reaction-diffusion SIR model with different diffusion coefficients. *Discrete and Continuous Dynamical Systems – S*, 18(4), 870-881.
7. Naz, R., Torrisi, M., & Imran, A. (2025). Lie symmetries and solutions for a reaction diffusion–advection SIS model with demographic effects. *Symmetry*, 17(1), 3.
8. Raza, A., & Zaman, F. D. (2025). The general classification, symmetry invariance analysis, and conservation laws of the one-dimensional damped wave equation with power and exponential law nonlinearities. (on-going)
9. Raza, A., Kara, A. H., & Alqurashi, B. M. (2025). A variational analysis and integration of a (2+1) fourth-order biharmonic equation via energy and momentum conservation. (on-going)
10. Raza, A., Kara, A. H., & Moyo, S. (2025). The symmetry invariance of conservation laws and application to the multi-reduction and multi-soliton analysis of the (2+1) Zakharov- Kuznetsov (ZK) equation in plasma physics with triple-power law nonlinearity. (on going)
11. Raza, A., Mahomed, F. M., Zaman, F. D., & Kara, A. H. (2025). General classification, invariance, and conservation laws analyses of nonlinear fourth-order wave and nerve membrane equations with dissipation. (on-going)
12. Shabbir, M., Chand, S., Iqbal, F. & Kisi, O. (2025). Novel Hybrid Approach for River Inflow Modeling: Case Study of the Indus River Basin, *Pakistan Journal of Hydrologic Engineering*. (Accepted)
13. Shah, S. A. A., Zaman, Q., Wasim, D., Allohibi, J., Alharbi, A. A., & Shabbir, M. (2025). Optimal model for predicting highest runs chase outcomes in T-20 international cricket using modern classification algorithms. *Alexandria Engineering Journal*, 114, 588-598.

### **HEC X and Y Category Journal Articles**

1. Beg, I. (2025). Separating hyperplane theorems in convex metric space. Journal of Nonlinear Science and Applications, 18, 29-32.

### **Books**

1. Ali, A. Raag Rass (Urdu)
2. Ali, A. The Tradition of Todi (English)

### **Book Chapters**

1. Beg, I., Book chapter; Cubic Analytic Hierarchy Process with application in decision making. Book Chapter in Decision Making under Uncertainty via Optimization, Modelling and Analysis. (Edited by Laxminarayan Sahoo, Tapan Senapati and Ronald R. Yager) Studies in Systems, Decision and Control, book series. Publisher Springer 2025 (co-authors M. Gulistan and M. Asif). (in press)

### **National Conference Papers**

1. Ali, A. APMC Annual Magazine article on South Asian Raags

### **Artistic productions (catalogued)**

1. All Pakistan Music Conference, Annual Festival, 2025 performance on Dhurpad music