

**DEPARTMENT OF MATHEMATICS &
STATISTICAL SCIENCES**

Research Vision

To be a nationally leading and internationally recognized department in Mathematics, Statistics and Data Science including Mathematical Economics, Quantitative Finance, and Decision Sciences for conducting high-quality and impactful research.

Research Mission

Our department's research mission is to

- Create a supportive and inclusive environment to facilitate the growth of faculty as researchers and scholars.
- Contribute to Lahore School's overall research mission by actively supporting research initiatives within the business and economics disciplines.
- Undertake research endeavours addressing key economic challenges, supporting the Lahore School's mission to contribute to the management of Pakistan's economy.

Research Objectives

The research objectives of the Department for Mathematics and Statistical Sciences are to:

- I. Conduct high quality research in Mathematics, Statistics, Data Science, and interdisciplinary fields.
- II. Encourage collaborations with industry stakeholders and government agencies to address real-world problems using mathematical and statistical methods.
- III. Enhance research quality and visibility through publications in top-ranked international journals and by fostering collaborations with researchers from the world's leading universities.
- IV. Encourage and facilitate organization and active participation in virtual/hybrid/in-person conferences, workshops, and scientific forums at national and international levels, to enhance networking and knowledge sharing.
- V. Volunteer as a reviewer and editor for world-renowned journals to support the research community.
- VI. Develop collaborative and interdisciplinary research initiatives aligned with the needs of undergraduate programs in Mathematics, Statistics, Data Analytics, Finance, Business, and Economics, promoting data-driven inquiry and the responsible use of analytical and computational tools.
- VII. Establish strategic partnerships with research institutions, community organizations, and industry stakeholders to provide students with practical and applied research

opportunities.

Research Programmes

Our department has planned several new initiatives aimed at enhancing the capacity of our faculty and providing them with exposure to recent developments in Mathematics, Statistics, and Data Science, as well as the latest cutting-edge research methods. These initiatives will be implemented over the next five years and will include:

- I. **Seminar Series:** This program aims to facilitate interdisciplinary collaboration, provides a platform for networking and knowledge sharing, and reaches a wider audience. The program will consist of both attending and conducting seminars (physical and virtual) on various topics related to Mathematics, Statistics, and Computational Sciences.
- II. **Interdisciplinary Research Collaboration:** Our faculty prioritizes interdisciplinary research endeavours and will continue to work on both ongoing and new research projects with colleagues from the faculties of economics, business, social sciences, and environmental sciences over the next five years.
- III. **Research Capacity Building:** This program aims to provide hybrid research development opportunities through conferences (physical and virtual) and workshops on Mathematics, Statistics, and Data Science. Participants will have the opportunity to engage with and learn from experts across the globe. Faculty members will be encouraged to attend specialized training in artificial intelligence (AI), including machine learning, deep learning, and AI-driven quantitative analysis.
- IV. **Industry-Linked Student Research:** Promote collaborative research projects where students in Mathematics, Statistics, Data Analytics, Finance, and Economics work on real-world challenges faced by Pakistani companies and organizations. These projects foster collaboration between students, faculty, and industry professionals, applying mathematical, analytical, and data-driven methods to solve practical case studies and contribute to evidence-based solutions.
- V. **Developing an Integrated Framework for Data Science:** This initiative aims to explore software components for data management, cleaning, visualization, statistical analysis, machine learning, and AI and develop an integrated framework for data science.
- VI. **Faculty Research Themes:**
Our faculty members are engaged in diverse research areas, including:

- Order, Fixed Point Theory, Fuzzy Sets and their Applications, Multi-criteria Decision Methods, Uncertainty Modelling.
- Time Series Econometrics with applications in Finance and Risk Modeling
- Applications of Structural Equation Modeling (SEM) in social sciences.
- Statistical Inference and High-Dimensional Data Analysis.
- Lie Group Theoretical methods for differential equations.
- Modeling and Analysis of Physical, Biological, and Economic Models, as well as other areas of Applied Mathematics.
- The development of computational and symbolic techniques for simulation and optimization.
- Application of Mathematical tools in musicology in the domain of South Asian Raags.