

Dr. Rukhsana Kausar
Department of Data Science

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My research interests span the areas of modeling and simulation of real world problems via partial differential equation, switched system, stochastic PDEs and other mathematical modeling techniques. I have a specific interest in modeling networks with above mentioned two mathematical tools, comparison of their results and existence and uniqueness theory specially non linear switched differential algebraic equations. To obtain a challenging and rewarding researcher and academic position where a degree in applied Mathematics and 20 years of experience as a university Professor and researcher will be fully utilized.

Education

TU Kaiserslautern, Germany (2014-2018)

PhD, in Natural Sciences, Department of system and Control systems

Accomplished on scholarship from University of the Punjab, Lahore Pakistan and University of Kaiserslautern, Germany.

TU Kaiserslautern, Germany (2012-2014)

MS Applied Mathematics, Specialisation in modeling via Partial differential equations.

Accomplished on scholarship from University of the Punjab, Lahore Pakistan.

University of the Punjab, Lahore (1999-2001)

Masters in Mathematics, Applied Mathematics.

University of the Punjab, Lahore (1997-1999)

Bsc(2 years) with Mathematics and Physics.

Employment

Lecturer, PUCIT, University of the Punjab (2001-2008), Contract

- Supervising undergraduate dissertations
- Assisting with programme development and student assessment
- Delivering teaching sessions on BSc Linear algebra, Discere Mathematics, Differential equations,
- Student assessment

Lecturer, PUCIT, University of the Punjab (2008-2019), Regular

- Supervising undergraduate dissertations
- Assisting with programme development and student assessment
- Delivering teaching sessions on BSc Linear algebra, Discere Mathematics, Differential equations, Multivariable Calculus
- Student assessment

Subject taught.

- Probability and statistics,
- Quantitative analysis,
- Calculus,
- Multivariate calculus,
- Operation research,
- Mathematics for Machine learning
- Numerical analysis,

Assistant Professor (Adhoc): PUCIT, University of the Punjab (2008-2019), Regular

- Supervising undergraduate dissertations
- Assisting with programme development and student assessment
- Delivering teaching sessions on BSc Linear algebra, Discere Mathematics, Differential equations, Multivariable Calculus

Student assessment

Publications

- Jochen Kall, Rukhsana Kausar, Stephan Trenn, Modeling water hammers via PDEs and switched DAEs with numerical justification. PIFAC-PapersOnLine, 50(1), 5349-5354.
- Rukhsana Kausar, Stephan Trenn, Water hammer modeling for water networks via hyperbolic PDEs and switched DAEs XVI International Conference on Hyperbolic Problems: Theory, Numerics, Applications (pp. 123-135). Springer, Cham.
- Rukhsana Kausar, Stephan Trenn, Impulses in structured nonlinear switched DAEs In Decision and Control (CDC), 2017 IEEE 56th Annual Conference on (pp. 3181-3186). IEEE.
- Rukhsana Kausar, Regularity characterisation water network System and control letter, Accepted for Publication.

Research skills

- Analysis of the problems
- Programming higher order numerical methods in Partial differential equations.
- Fault detection via switched differential algebraic equations
- Mathematical modelling

- Application of scientific theory to qualitative data

Conferences and presentations

- Research paper presentation at CDC 2017, Melbourne , Australia.
- Presentation at ECMI 2016 , Santiago de compestella, Spain.
- Poster presentation at HYPO 2016, Aachen Germany.
- International conference on machine vision, National university of science and technology, Islamabad, Pakistan.
- Conference on Applied mathematics,LUMS. Lahore.

Awards

- Scholarship under faculty development program University of the Punjab.
- Best student award in BSC from Queen Mary college Lahore

Other qualifications

- PGD in computer science from Government college university Lahore.

Projects

- **Computing thickness of cortex, under Prof. Brend Simeon,Dr. Anh-Vu Voung.**In this project we were having 2D image data from segmentation process and we have computed the thickness of the cortex using an Eulerian PDE, Approach for Computing Tissue Thickness as exact and fast as possible and visualized the result such that medical doctors can draw conclusions from it. This presentation was appreciated by Prof. Brend simeon. The presentation was archived as an example for other students.
- **Analysing fluid dynamics usng particle methods Under Prof. Axel Klar and Dr Sudarshan Tiwari.**
- **Invasion of cancer cells Under Prof. Christina Surulescu and Dr christian stinner.**
- **Fault detection in signals for Hybrid self driving cars , in cooperation with BMW and Technische Hochschule Ingolstadt (THI), Germany.** KI-LIDAR project is to realize a thermo mechanically robust and compact 3D flash lidar sensor with predictive condition monitoring (Prognostic Health Management) for KI-based function monitoring under industrial conditions and to test it under relevant load scenarios. , Joint work with Universoty of Groningen and Technische Hochschule Ingolstadt (THI)

References

Provided in the application form attached herewith.