MADHUMITA PAUL

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SUMMARY

An enthusiastic and inquisitive person. An avid learner with interest in applicable mathematics. I am a hard working person who enjoys collaborating with different disciplines to develop new skills and solving new problems. Current research interest revolves around the spectral analysis of Schrödinger operator on quantum graphs. Proficient in teaching undergraduate courses and mentoring students.

TECHNICAL SKILLS

- **Languages & Frameworks:** Python, C.
- **Software Tools:** MATLAB, Mathematica, Latex.
- **O.S**: -Windows.

ACADEMIC QUALIFICATIONS

University	Degree	Year	Domain
UNC Charlotte, USA	*Ph.D. (Doctorate)*	Fall 2022(expected)	Applied Mathematics, **GPA - 3.84/4**
Birla Institute of Technology, India	*M.Sc. (Masters)*	May 2016	Applied Mathematics., **CGPA - 8.65/10**
West Bengal State University., India	*B.Sc. (Bachelors)*	May 2012	Mathematics (Honors), **GPA – 3.5/4**

WORK EXPERIENCE

Position/Organization	Courses/Role	Period
Instructor, Department of Applied Mathematics and Statistics, UNC Charlotte (UNCC)	Math1103-Pre-calculus, Math1121-calculus for Engineering and technology, Intro to Mathematical Thinking, Math1120-Calculus, Math1100-College Algebra, STAT 1220- Business statistics	fall 2018 – fall 2021, fall 2022, spring 2023
Tutor, UNCC	Pre-calculus, College Algebra Calculus-1, Calculus-2, Business calculus, Differential Equations, Linear algebra	fall 2017- summer 2022
Grader, UNCC	Linear Algebra, Modern Algebra, Calculus, Operation Research, Metrices and Algebra.	fall 2017, spring 2018, summer 2018, summer 2020

EXPERTISE

- Teaching undergraduate courses.
- Tutoring and mentoring students.
- Data Analysis with Python
- Spectral analysis of operators on physical models.

RELEVANT COURSES

Pure and Applied Mathematics: Real Analysis 1,Real analysis 2, Modern Algebra, complex analysis, Functional analysis, Numerical methods for partial differential equations, Analysis, Probability & statistics, Discrete Mathematical structure, Differential Equations, Partial Differential, Riemannian geometry & Differential geometry, Advanced Numerical Methods & Difference Equations, Computational Fluid Dynamics, Hydrodynamics & Potential Theory, Topology & Functional Analysis, Advanced PDE and Boundary Value Problem. Operation Research, Number Theory, and Its Application, Classical Mechanics & Hydrostatics, Data structure and Algorithm Design, Programming in C.

Quantum Mechanics: quantum mechanics, applied quantum mechanics, and studied tunneling time properties as an independent study course

Mandatory course: Responsible conduct of research, Academic Integrity, as part of the degree requirement in PhD. Disaster management, as part of the degree requirement in Masters' degree

MAJOR PROJECTS

I. **Doctoral Research Project: Spectral Theory of Schrödinger Operator:** Performing qualitative spectral analysis of the Schrödinger operator on a spider type graph with different type of potential.

II. **Ph.D., Quantum mechanics Course Project:** Experimental observation of quantum chaos in a beam of light.

III. **Wolfram Winter School project**: Listening to Substitution system -> Represented the evolution of substitution system in timeseries then apply the Fourier transform on to it. The resulting spectrum were then analyzed and played as an audio signal. Also, understanding the qualitative differences the spectra might have for different substitution system.

DOCTORAL RESEARCH

I. **Spectral analysis of Schrodinger operator with Summable potential on a quantum (spider type) graph:**
- Calculating eigenvalue, eigenfunction. Predicting the spectral measure and the behavior of the asymptotic of the eigenfunctions near infinity.

II. **Spectral analysis of Schrodinger operator with Infinite potential on a quantum (spider type) graph:**
- Calculating eigenvalue, eigenfunction. Predicting the spectral measure and the behavior of the asymptotic of the eigenfunctions near infinity

III. **Spectral analysis of Schrodinger operator with Mixed potential on a quantum (spider type) graph:**
- Calculating eigenvalue, eigenfunction. Predicting the spectral measure and the behavior of the asymptotic of the eigenfunctions near infinity

IV. **Spectral analysis of Schrodinger operator with Periodic potential on a quantum (spider type) graph:**
- Calculating eigenvalue, eigenfunction. Predicting the spectral measure and the behavior of the asymptotic of the eigenfunctions near infinity

TALKS:
- Spectral Theory of the Schrodinger Operator on Half Axis with Increasing Potential @ October Math Day Symposium, UNC Charlotte.

SELECTED PUBLICATIONS
- **(Conference)** Prabjot Kaur & Madhumita Pal. (2015) Selection of vendor based on intuitionistic fuzzy linguistic hedges. Notes on IFS, Volume 21,2015, number 4, pages 69-75.

MASTER'S RESEARCH

Existence of positive solutions of Boundary value problems:
- Investigation of the existence of positive solutions of singular nonlinear three-point boundary value problem under some conditions.
- Investigation of the existence of positive solutions of nonlinear first order boundary value problem with nonlinear non-local boundary condition.

WORKSHOPS:
- Using Feedback to Improve Teaching & Learning
- Viewpoint Diversity & Civil Discourse in the Classroom

CERTIFICATION
- Hazing Prevention 101TM Course-College Edition 2021
- Data Analysis with Python-an online non-credit course authorized by IBM and offered through Coursera
- Crash course on Python – an online non-credit course authorized by Google and offered through Coursera

PROFESSIONAL ACTIVITIES & MEMBERSHIPS
- Serving as a certified *Trained Mentor* through Mentor Collective for mentoring academic students (especially graduate students) in various institutes across the United States. Helping and advising mentees with academic, research, career goals and aims, and even personal issues.
- Mathematics Graduate Student Association: Vice President (2022-2023)
- Student member, American Mathematica Society.

AWARDS AND SCHOLARSHIPS
- Received *GASP* Scholarship at UNC Charlotte during doctoral studies.

VOLUNTEER ACTIVITIES

- Helped in organizing The Palmetto Number Theory Series (PANTS) In The university of North Carolina at Charlotte, September 2019