



Muhammad Sami Siddiqui

Curriculum Vitae

Education

2016–2023 **PhD**, *Institute of Business Administration*, Karachi
Computational Mathematics & Stability Analysis

2013–2015 **Master of Science**, *Institute of Business Administration*, Karachi
Abstract Algebra & Category Theory

2009–2012 **Bachelor of Science in Mathematics**, *Federal Urdu University*, Karachi
Specialized in Mathematics(Pure & Applied)

2006–2008 **Intermediate**, *Govt. Superior Sci. College*, Karachi
Pre-Engineering

2004–2006 **Matriculation**, *Al-Shams School*, Karachi
Science

Doctoral Thesis

Title *Stability Analysis and Approximation Methods for Euler's Elastica Problem*

Description The thesis examines the deformation and stability of elastic rings under symmetric and asymmetric external loads using Euler's elastica model. Analytical and numerical techniques, including the Newton–harmonic balance and harmonic balance methods, are employed to analyze equilibrium configurations at large pressures, capturing phenomena such as self-contact and self-intersection. The study extends to asymmetric loading scenarios, including surface-supported and nested rings, and performs two-parameter bifurcation analyses. Key bifurcation types, such as, pitchfork, hysteresis, and cusp, along with critical points such as limit, branch, and Bogdanov–Takens points, are identified. Numerical solutions for open elastic rods further illustrate the bifurcation behavior across various configurations.

Masters Thesis

Title *Categorical representation of Polylogarithmic groups*

Description This thesis explores the idea of transforming the groundwork of polylogarithmic groups into category theory, which is a more generalized way to mathematical formalism.

Experience

Research Achievement

Int. Publ. **Majid, A.; & Siddiqui, S.**, *Self-contact of a flexible loop under uniform hydrostatic pressure*, EUROPEAN JOURNAL OF MECHANICS - A/SOLIDS, Volume 84 November–December 2020

Axv. Publ. **Siddiqui, M. S.**, *Stability analysis of Euler's elastica ring using harmonic balance*, ARXIV PREPRINT ARXIV:2508.16704 2025

Axv. Publ. **Kanwal, M., Siddiqui, M. S., & Ali, S. A.**, *Unveiling Gamer Archetypes through Multi modal feature Correlations and Unsupervised Learning.*, ARXIV PREPRINT ARXIV:2510.10263 2025

Conference-Seminar-Workshop-Presentation

Conference **Residue Harmonic Balance Method for Buckling and Self-Contact of a Flexible Loop under Uniform Pressure**, *Abdus Salam International Conference on MATHEMATICAL SCIENCES & EMERGING TECHNOLOGIES (AS-ICMSET-2025)*, Lahore-Pakistan, ASSMS, GCU
Talk 24 Nov 2025 to 26 Nov 2025

Conference **Approximation methods for the Euler's elastica ring model and its stability analysis**, *XIII Annual International Conference of the Georgian Mathematical Union*, Batumi, Georgia, Shota Rustaveli State University
Talk 04 Sept 2023 to 09 Sept 2023

Conference **Euler's elastica model**, *Fifteenth Conference of the Euro-American Consortium for Promoting the Application of Mathematics in Technical and Natural Sciences*, Albena, Bulgaria
Talk 21st June 2023

Conference **Euler Elastica Model**, *International Conference of Young Mathematicians*, Institute of Mathematics of NAS of Ukraine, Kyiv, Ukraine
Talk 1st June 2023

Research Colloquia **Mathematical Treatment of Euler Elastica Model**, *IBA-Khi*, May 2023

Contributed Talk **Euler Elastica Model & Its Treatment**, *SWAM 2022*, University of Charles, Prague, Czech Republic
Talk Nov 2022

Research Talk **Stability & Bifurcation Analysis of Euler's Elastica Model**, *IBA-Khi*, Oct 2022

Research Talk **Euler Elastica Model & Its Treatment**, *IBA-Khi*, Aug 2022

Workshop

2023 **Nonlinear Dispersive Waves**, *University College Cork*, Ireland

2018 **2nd IWR-CUI Joint Workshop on Numerical Solutions of Partial Differential Equations**, *COMSATS*, Islamabad

2017 **Computational Biology Workshop**, *Habib University*, Karachi

Stipend & Research Funding

2013 – 2016 **MS Mathematics**, *IBA*, Khi, Monthly Stipend

2017 – 2022 **PhD Mathematics**, *IBA*, Khi, Monthly Stipend

2022 **Secure research travel grant**, *IBA*, Karachi, Contributed talk at SWAM Charles University, Prague

Teaching Experience

Course Instructor

Jan 2026 **Assistant Professor**, *Department of Mathematics*, NED UNIVERSITY, Karachi onward

Description Teach undergraduate mathematics courses for Engineering & Science programs

Courses:

- Linear Algebra & Geometry
- Advance Calculus & Linear Algebra
- Linear Algebra & Ordinary Differential Equation

May 2024 to Dec 2025 **Assistant Professor**, *Faculty of Engineering Sciences and Technology*, IQRA UNIVERSITY, Main Campus Karachi

Description Teach undergraduate mathematics courses for Computer Science and Engineering programs, lead the development and implementation of a uniform course format, and contribute to departmental responsibilities such as supervising course folders for NCEAC or HEC visits, course redesign and revision, and involvement in the Outcome-Based Learning Committee.

Courses:

- Calculus and Analytical Geometry
- Multivariate Calculus
- Discrete Mathematics
- Numerical Computing
- Introduction to Mathematics

Aug 2024 to Dec 2024 **Visiting Faculty**, *School of Mathematics and Computer Sciences*, IBA-KHI, Main Campus Karachi

Course:

- Calculus II

Jan 2023 to Dec 2024 **Adjunct Faculty**, *Integrated Science and Mathematics*, HABIB UNIVERSITY, Karachi

Description Follow course material and assignment and organize quiz and exam with the course-lead, practice active learning techniques, such as hands on experience, visual explanation, and individual help and mentoring to students.

Courses:

- Calculus II
- Linear Algebra
- Calculus I
- Numerical Computing
- Introduction to Probability
- Engineering Mathematics

Jan 2017 to May 2021	PhD Scholar Teaching , <i>School of Mathematics and Computer Sciences</i> , INSTITUTE OF BUSINESS ADMINISTRATION, Karachi
Description	Organizing course material, quiz and assignment, practice active learning techniques, and help students and mentoring.
Courses:	<ul style="list-style-type: none"> <input type="radio"/> Calculus I <input type="radio"/> Introduction to Statistics <input type="radio"/> Calculus II <input type="radio"/> Business Math & Linear Algebra
Aug 2013 to Dec 2016	Teaching Assistant , INSTITUTE OF BUSINESS ADMINISTRATION, Karachi
Description	Taking tutorials and making quiz and assignment, and checking, and counseling hours to students.
Courses:	<ul style="list-style-type: none"> <input type="radio"/> Calculus <input type="radio"/> Linear Algebra <input type="radio"/> Introduction to Differential Equation <input type="radio"/> Functional Analysis <input type="radio"/> Abstract Algebra <input type="radio"/> Partial Differential Equation

Computer skills

Mathematics Software MATHEMATICA , MATLAB & MAPLE

Extra-Circular Activities

- 2014–2015 Manager of student's society, IBA Maths and Astronomy Club.
- 2015 Organized IBA Maths and Astronomy Club's First Grand Event, *IBA Mathematika*.
- 2014–2016 Organized Seminars and Research Talks