

Prof. Dr. Md Fazlul Hoque

Professor and Chairman, Department of Mathematics
Pabna University of Science and Technology (PUST), Pabna-6600, Bangladesh
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Faculty Profile | Google Scholar

Academic Profile

Mathematician and university educator with extensive experience in undergraduate and postgraduate teaching, research supervision, curriculum development, and academic leadership. Research expertise includes mathematical physics, integrable and superintegrable systems, algebraic methods, Lie algebras, and special functions. Experienced in designing Outcome-Based Education (OBE) curricula, institutional quality assurance, and teaching mathematics to students with varied academic backgrounds. Interested in contributing to undergraduate teaching, graduate education, student mentoring, and departmental service at any university.

Teaching Interests

Calculus; Linear Algebra; Differential Equations; Real and Complex Analysis; Abstract Algebra; Group and Ring Theory; Functional Analysis; Lie Algebras and Representation Theory; Applications of Lie Groups to Differential Equations; Mathematical Methods for Physics; Quantum Mechanics; Special Functions; Mathematical Modeling.

Academic Appointments

Professor, Department of Mathematics Pabna University of Science and Technology, Bangladesh	<i>March 2021–Present</i>
Associate Professor, Department of Mathematics Pabna University of Science and Technology, Bangladesh	<i>February 2017–March 2021</i>
Assistant Professor, Department of Mathematics Pabna University of Science and Technology, Bangladesh	<i>March 2012–February 2017</i>
Lecturer, Department of Mathematics Pabna University of Science and Technology, Bangladesh	<i>April 2009–March 2012</i>
Lecturer, Department of Mathematics Lalmatia Women College, Dhaka, Bangladesh	<i>August 2008–February 2009</i>

Education and Research Training

Ph.D. in Mathematics , The University of Queensland, St. Lucia, Brisbane, Australia Thesis: <i>Superintegrable Systems, Polynomial Algebra Structures and Exact Derivations of Spectra</i> . Supervisors: Professor Yao-Zhong Zhang and Dr. Ian Marquette.	2014–2018
Postdoctoral Research Fellow , Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Czech Republic Supervisor: Professor Doc Ing. Libor Snobl.	2022–2023
M.Phil. in Mathematics , University of Rajshahi, Bangladesh Thesis: <i>On Supra Fuzzy Topological Spaces</i> . Supervisor: Professor Dewan Muslim Ali.	2009–2011
M.Sc. in Mathematics (Thesis) , University of Rajshahi, Bangladesh	2005–2006

Thesis: *A Study on Characterizations of General Radical Classes of Rings*. Supervisor: Professor Akhil Chandra Paul. First class, first position; Gold Medal for excellence in Mathematics.

B.Sc. (Honours) in Mathematics, University of Rajshahi, Bangladesh 2001–2005
First class, second position; Gold Medal for first class in Honours.

Teaching Experience

University Teaching: Undergraduate and postgraduate mathematics instruction at PUST since 2009, including courses in pure mathematics, applied mathematics, and mathematical physics. Teaching experience includes students in mathematics and other scientific and engineering disciplines.

Tutor, School of Mathematics and Physics, The University of Queensland, Australia 2014–2018

- Supported teaching in multivariate calculus and ordinary differential equations; also contributed to calculus and linear algebra instruction.
- Helped students develop conceptual understanding and problem-solving skills through tutorials and worked examples.

Selected courses taught

- Calculus; Real Analysis; Complex Analysis; Functional Analysis.
- Group Theory; Ring Theory; Rings and Radicals; Fuzzy Mathematics.
- Lie Algebras and Representations; Applications of Lie Groups to Differential Equations.
- Algebraic Methods of Mathematical Physics; Quantum Mechanics; Astronomy.

Curriculum Development and Academic Quality Assurance

- **Chair, OBE Curriculum Committee, Department of Mathematics, PUST:** Led the committee responsible for developing Outcome-Based Education curricula for the Honours and Master's programs in Mathematics. Contributed to defining program and course learning outcomes and aligning course objectives, teaching activities, and assessment.
- **OBE curriculum expert, other universities:** Served as an expert contributing to Outcome-Based Education curriculum development for mathematics programs at different universities.
- **Director, Institutional Quality Assurance Cell (IQAC), PUST** March–April 2024
Contributed to institutional academic quality assurance and continuous improvement processes.

Academic Leadership and Service

- **Head/Chairman, Department of Mathematics, PUST** April 2024–Present.
- **Head/Chairman, Department of Mathematics, PUST** April 2020–December 2021.
- **Dean, Faculty of Science, PUST** April 2024–April 2026.
- **Dean, Faculty of Science, PUST** July 2019–July 2021.
- **Convener, International Conference on Emerging Frontiers in Advanced Sciences and Technologies (EFAST 2026)** June 27–28, 2026.
- **Convener, 15th National Undergraduate Mathematics Olympiad, Rajshahi Region** December 2024.
- **Visiting Researcher, Department of Mathematics, University of Hawaii at Manoa, USA** November–December 2016.
- **Senior Research Associate, School of Economics, The University of Queensland, Australia** November 2015–June 2016.
- **Research Assistant, School of Economics, The University of Queensland, Australia** November 2017–April 2018.
- **Associate Editor, GANIT: Journal of Bangladesh Mathematical Society** March 2026–Present.

- **Executive Member, Bangladesh Mathematical Society** 2024–2025.
- **General Secretary, PUST Teachers' Association** 2018–2019.
- **President, PUST Blood Donors Club** 2010–2014.

Research Areas

Mathematical physics; classical and quantum integrable and superintegrable systems; exactly and quasi-exactly solvable models; quadratic and polynomial symmetry algebras; Lie algebras and representations; special functions and orthogonal polynomials; nonlinear dynamics; algebra and ring theory.

Research Supervision and Mentoring

Supervised undergraduate Honours projects, M.Sc. theses, and M.Phil. research, including projects in algebra, mathematical physics, quantum superintegrability, and nonlinear differential equations. Typical annual supervision includes 4–5 undergraduate projects and 1–2 Master's theses. Committed to helping students develop mathematical independence, research skills, and clear scientific communication, and to supporting students from varied backgrounds in pursuing advanced study.

Selected postgraduate supervision

- Md. Saikat Hossain, M.Sc., *Algebraic Technique to Obtain Exact Solutions and Energy Spectra for Quantum Superintegrable Models* (completed 2025).
- Mst. Shekha Khatun, M.Phil., *Algebraic Aspects of Higher-Dimensional Superintegrable Systems and Their Algebra Structures* (completed 2024).
- Mohasena Ahamed, M.Sc., *Algebraic Applications on Quantum Superintegrable Models* (completed 2021).
- Nondita Paul, M.Sc., *A Study of Centralizers and Derivations on Rings and Gamma Rings* (completed 2021).
- Shelina Akter, M.Sc. thesis, co-supervision (completed 2016).

Selected Publications

1. S. Ara, M. F. Hoque, and I. Marquette, "Quadratic symmetry algebras and Sturm algebraization of superintegrable systems with magnetic fields," arXiv:2610.01869 (2026 preprint).
2. M. F. Hoque, A. Marchesiello, and L. Snobl, "Integrable systems of the ellipsoidal, paraboloidal and conical type with magnetic field," *Journal of Physics A: Mathematical and Theoretical*, 57, 225201 (2024).
3. M. F. Hoque, O. Kubu, A. Marchesiello, and L. Snobl, "New classes of quadratically integrable systems with velocity dependent potentials: non-subgroup type cases," *The European Physical Journal Plus*, 138, 845 (2023).
4. M. F. Hoque and L. Snobl, "Family of nonstandard integrable and superintegrable classical Hamiltonian systems in non-vanishing magnetic fields," *Journal of Physics A: Mathematical and Theoretical*, 56, 165203 (2023).
5. M. Ahamed and M. F. Hoque, "Quadratic symmetry algebras and spectrum of the 3D nondegenerate quantum superintegrable system," *International Journal of Mathematical Combinatorics*, 3, 1–20 (2022).
6. F. Correa, M. F. Hoque, I. Marquette, and Y.-Z. Zhang, "N-dimensional Smorodinsky–Winternitz model and related higher rank quadratic algebra SW(N)," *Journal of Physics A: Mathematical and Theoretical*, 54, 395201 (2021).
7. M. F. Hoque, I. Marquette, and Y.-Z. Zhang, "Recurrence approach and higher rank polynomial algebras for superintegrable monopole systems," *Journal of Mathematical Physics*, 59, 052101 (2018).
8. M. F. Hoque, I. Marquette, S. Post, and Y.-Z. Zhang, "Algebraic calculations for spectrum of superintegrable system from exceptional orthogonal polynomials," *Annals of Physics*, 391, 203 (2018).
9. M. F. Hoque, I. Marquette, and Y.-Z. Zhang, "Quadratic algebra structure in the 5D Kepler system with non-central potentials and Yang–Coulomb monopole interaction," *Annals of Physics*, 380, 121 (2017).

10. M. F. Hoque, I. Marquette, and Y.-Z. Zhang, “Quadratic algebra for superintegrable monopole system in a Taub–NUT space,” *Journal of Mathematical Physics*, 57, 092104 (2016).
11. M. F. Hoque, I. Marquette, and Y.-Z. Zhang, “Recurrence approach and higher rank cubic algebras for the N-dimensional superintegrable systems,” *Journal of Physics A: Mathematical and Theoretical*, 49, 125201 (2016).
12. M. F. Hoque, I. Marquette, and Y.-Z. Zhang, “A new family of N-dimensional superintegrable double singular oscillators and quadratic algebra $Q(3) \oplus so(n) \oplus so(N - n)$,” *Journal of Physics A: Mathematical and Theoretical*, 48, 445207 (2015).
13. M. F. Hoque, I. Marquette, and Y.-Z. Zhang, “Quadratic algebra structure and spectrum of a new superintegrable system in N-dimension,” *Journal of Physics A: Mathematical and Theoretical*, 48, 185201 (2015).

Publication record: Author of 65 publications according to the PUST faculty profile. For the complete and updated list, see [Google Scholar](#) and the [official PUST profile](#).

Selected Awards and Research Support

- University Grants Commission of Bangladesh research grant, “Algebraic Technique to Obtain Exact Solutions and Energy Spectra for Quantum Superintegrable Models,” 2023–2024.
- Research grants from PUST funded by the University Grants Commission of Bangladesh, 2018–2019, 2020–2021, 2023–2024, and 2024–2025.
- International Postgraduate Research Scholarship (IPRS), Australia, 2014–2017.
- Australian Postgraduate Award (APA), Australia, 2014–2017.
- Graduate School International Travel Award (GSITA), The University of Queensland, 2016.
- Gold Medal for excellence in Mathematics, University of Rajshahi / A. F. Mujibur Rahman Foundation.
- Gold Medal for excellence in Honours Mathematics, University of Rajshahi / Shaheed Suhrawardy Hall.

Selected Invited and Keynote Presentations

- “Algebraic Structures Beyond Lie Theory and Their Applications,” Keynote Speaker, 1st Workshop on Algebra and its Applications, SUST, Bangladesh, December 2025.
- “Algebra of Symmetry: Modern Applications of Lie Groups and Lie Algebras in Mathematics and Physics,” Keynote Speaker, 1st Workshop on Algebra and its Applications, SUST, Bangladesh, December 2025.
- “Lie algebraic applications in quantum physics,” Speaker, 24th International Mathematics Conference, University of Chittagong, Bangladesh, December 2025.
- “Why Lie Algebras are the Secret Engine of Modern Mathematics and Physics,” Keynote Speaker, Bangladesh Mathematical Society and Department of Mathematics, PUST, November 2025.
- “Research and Career Development in Mathematics around the Globe,” Keynote Speaker, Jamalpur Science and Technology University, Bangladesh, January 2025.
- “Symmetry Algebra Structures and Spectrum of Superintegrable Systems,” Invited Speaker, International Conference on Mathematics and Applications, University of Burdwan, India, March 2024.
- “Algebraic Approach on Superintegrable Monopole Systems,” Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, April 2023.
- “A family of three-dimensional classical Hamiltonian systems in magnetic fields,” XXXIV International Colloquium on Group Theoretical Methods in Physics, Strasbourg, France, 18–22 July 2022.
- “Quadratic algebras and spectrum of superintegrable systems,” XXXIX Workshop on Geometric Methods in Physics, Bialystok, Poland, June 19–25, 2022.
- “Higher rank quadratic algebra of the N-dimensional Smorodinsky-Winternitz model,” 9th annual meeting of Australian and New Zealand Association of Mathematical Physics (ANZAMP), Australian Mathematical Society, Melbourne, Australia, February 9–11, 2022.
- “Family of N-dimensional superintegrable systems and quadratic algebra structures,” XXIIIth Interna-

tional Conference on Integrable Systems and Quantum Symmetries, Prague, Czech Republic, 23–27 June, 2015.

- “Quadratic algebra structure and spectrum of a new superintegrable system,” 8th Australia New Zealand Mathematics Convention, Australian Mathematical Society, Melbourne, Australia, 8–12 December 2014.

Technical Skills

Mathematical and computational software: Mathematica, Maple, MATLAB, FORTRAN, C/C++, R, Python, and L^AT_EX.

Professional Memberships

Bangladesh Mathematical Society; Australian Mathematical Society (membership during 2014–2018); Rajshahi University Alumni Association (lifetime member); Rajshahi University Mathematics Alumni Association (lifetime member), Rajshahi University Lalmonirhat Alumni Association (lifetime member).

Country Visit

Australia, USA, Netherlands, Germany, Italy, Belgium, Austria, Switzerland, Slovakia, Hungary, Norway, Vatican City, Singapore, Malaysia, Hong Kong, Turkey, Qatar, UAE, India, Bangladesh.

References

A/Prof. Dr. Yao-Zhong Zhang

Ph.D. Thesis Principal Supervisor

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Dr. Ian Marquette

Ph.D. Thesis Associate Supervisor

Department of Mathematics and Physical Sciences, La Trobe University, Melbourne, VIC 3086, Australia

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Professor Doc. Ing. Libor Snobl

Postdoc Supervisor, Faculty of Nuclear Sciences and Physical Engineering,

Czech Technical University in Prague, Czech Republic

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Professor Dr. Sarah Post

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Professor Dr. Md Sahadat Hossain

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Professor Dr. Naruhiko Aizawa

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