Miranda House
UNIVERSITY OF DELHI

Name: **Dr. Rakhi Kumari**

Department: **Physics**

Current Designation: **Assistant Professor (Resource Person)**

Email id: dhakarakhi4@gmail.com

Academic Qualifications (reverse chronological order):

- (2025) Doctor of Philosophy (Ph.D.) in Computational Statistical Physics: Department of Physics & Astrophysics, University of Delhi.
  Thesis Title: “Random matrix and Network analysis of Protein families”.
  Supervisor: Prof. Nivedita Deo, Department of Physics & Astrophysics, University of Delhi.
- Qualified CSIR-JRF NET in Physical Sciences (AIR-32).
- (2017) Master of Science (M.Sc.) in Physics: Department of Physics, Maharshi Dayanand University (MDU), Rohtak (Haryana).
- (2015) Bachelor of Science (B.Sc.) Hons. in Physics: G.C.W. College, Maharshi Dayanand University (MDU), Rohtak (Haryana).
- (2012) Sr. Secondary (12^{th}): Govt. Model Sr. Sec. School, Board of School Education Haryana.
- (2010) Secondary (10^{th}): Govt. Model Sr. Sec. School, Board of School Education Haryana.

Research Degree(s) (reverse chronological order):

- (2025) Doctor of Philosophy (Ph.D.) in Computational Statistical Physics: Department of Physics & Astrophysics, University of Delhi.
  Thesis Title: “Random matrix and Network analysis of Protein families”.
  Supervisor: Prof. Nivedita Deo, Department of Physics & Astrophysics, University of Delhi.

Field of Specialization under the Subject/Discipline:

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Computational Statistical Physics, with a focus on Random Matrix Theory, Complex Network Analysis, and Computational Biophysics (Protein Family Analysis)

Total Teaching Experience:

- Worked as Guest faculty in Shivaji college, University of Delhi.
- Worked as Guest faculty in DSEU, PUSA-I.

Teaching Capabilities:

- Proficient in Python programming, with experience in applying computational and analytical techniques to scientific and data-driven problems.
- Skilled in designing and teaching **core programming courses**, including *Introduction to Programming*, *Data Structures and Algorithms*, and *Object-Oriented Programming in Python*.
- Capable of teaching **Artificial Intelligence** and **Machine Learning** courses, with emphasis on practical implementation using libraries such as *NumPy, pandas, scikit-learn, Matplotlib.*
- Experienced in integrating **computational modeling and data analysis** in interdisciplinary areas such as physics, biology, and complex systems.
- Able to mentor students in **project-based learning**, guiding them in developing coding efficiency, problem-solving skills, and research-oriented programming.
- Interest in developing and teaching new electives in **Computational Physics**, **Data Analytics**, and **AI for Scientific Research**.

Teaching at Miranda House since: 07 September 2026.

List of Publications (reverse chronological order):
(Articles in referred/peer-reviewed/UGC Care journals/ Books/Book Chapters)

- Rakhi Kumari, Pradeep Bhadola and Nivedita Deo, "Statistical analysis of proteins families: a network and random matrix approach". The European Physical Journal B (2024)97:148 , https://doi.org/10.1140/epjb/s10051-024-00781-6.
- Rakhi Kumari, and Nivedita Deo, "Determining Structural Sites of the IGPD Protein Family from

Patterns In Property Based Correlation Matrices ". Europhysics Letters (2024),148, 41001. https://iopscience.iop.org/article/10.1209/0295-5075/ad8c7a/meta

- Rakhi Kumari, Pradeep Bhadola and Nivedita Deo, "Random Matrix Analysis of Protein Families". ECS Transactions 107 (1) 18877-18891 (2022) 10.1149/10701.18877ecst©The Electrochemical Society.

Seminars/Workshops/Conferences attended (reverse chronological order):

- International Conference on Technologies for Smart Green Connected Societies, 2021 (ICTSGS-1-2021) led by Yamagata University Japan. Date: November 29, 2021, Talk: Random Matrix Analysis of Protein Families.
- International Conference on Frontiers in Physics, Materials Science & Nanotechnology (FPMSN-2022) Organised by Chaudhary Devi Lal University, Sirsa, Haryana (India). Date: March25, 2022, Title: Random Matrix Analysis of Protein Families.
- International Conference on "Computational Applied Science and its Applications" (ICCASA 2022), Department of Applied Sciences, University of Engineering and Management, Jaipur, Rajasthan (India). Talk: Random Matrix Analysis of Protein Families.
- International Conference on Emerging Frontiers in Sustainable, Functional and Advanced Materials (IC-SFAM 2026), Department of Physics, Shivaji College, University of Delhi.Oral: Statistical Physics Framework for Protein Families via Random Matrix and Network Theory