

Md. Joshem Uddin

Postdoctoral Research & Teaching Associate, University of Georgia

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🐙 [Github](#) | 🌐 [Personal Website](#) | [G](#) [Google Scholar](#)

Research Interests

Core areas: Topological and geometric machine learning; graph representation learning; graph neural networks and graph transformers; topological data analysis.

Temporal and relational learning: Temporal and spatio-temporal modeling; relational deep learning.

Applications: Cyberattack detection and smart-grid resilience; applied and computational mathematics; data science.

Education

PhD in Mathematics **2026**

The University of Texas at Dallas, Richardson, TX

Dissertation: *Topology-Aware Graph Learning: From Static Representations to Temporal Networks*

Advisor: [Prof. Baris Coskunuzer](#).

MS in Mathematics **2025**

The University of Texas at Dallas, Richardson, TX

Applied Mathematics Concentration

CGPA: 3.804/4.00

Graduate Certificate in Data Science **2025**

The University of Texas at Dallas, Richardson, TX

12 graduate credit hours

MS in Applied Mathematics **2018**

University of Dhaka, Dhaka, Bangladesh

GPA: 4.00/4.00

BS in Mathematics **2016**

University of Dhaka, Dhaka, Bangladesh

CGPA: 3.95/4.00

Academic Appointments and Research Experience

Postdoctoral Research & Teaching Associate Fall 2026–Present

University of Georgia

Athens, GA

- Research area: topological and graph machine learning, relational learning, and applications to complex data systems.

Graduate/PhD Researcher 2021–2026

Topological Machine Learning Group, The University of Texas at Dallas

Richardson, TX

- Designed and implemented topology-aware graph learning architectures, including **TopoFormer**, **SCNode**, and **T3Former**, for static, temporal, and spatio-temporal graph learning tasks.
- Developed persistent-homology, multiparameter-persistence, spectral, structural, and contextual descriptors for graph representation learning.
- Contributed to NSF-funded projects on topological machine learning, algorithms for threat detection, and algorithms for modern power systems.

- Collaborated with mathematics, computer science, and engineering researchers on smart-grid security, power-grid resilience, and graph learning benchmarks.

Lecturer, Research Track*Department of Applied Mathematics, University of Dhaka*

Nov. 2018–Aug. 2021

Dhaka, Bangladesh

- Taught undergraduate and graduate courses in applied mathematics, linear algebra, mathematical methods, and mathematical modeling.
- Conducted research on numerical modeling, option pricing, atmospheric modeling, and computational mathematics.
- Supervised undergraduate capstone projects and contributed to departmental academic activities.

Lecturer*Department of Mathematics, American International University-Bangladesh*

May 2018–Nov. 2018

Dhaka, Bangladesh

- Taught engineering mathematics and ordinary differential equations.

Graduate Researcher*Department of Applied Mathematics, University of Dhaka*

2017–2018

Dhaka, Bangladesh

- Conducted MS thesis research on mathematical and numerical modeling of atmospheric phenomena using the WRF-ARW model.

Publications**Published**

- [1] *TopoFormer: Topology Meets Attention for Graph Learning*. M. J. Uddin, A. Tola, C. Akcora, and B. Coskunuzer. **International Conference on Learning Representations (ICLR)**, 2026.
- [2] *T3Former: Temporal Graph Classification with Topological Machine Learning*. M. J. Uddin, S. Changani, and B. Coskunuzer. **AAAI Conference on Artificial Intelligence (AAAI)**, 2026.
- [3] *MP-Grid: Detecting Power Grid Outages with Topological Machine Learning*. M. J. Uddin, D. Olojede, R. A. Jacob, J. Zhang, and B. Coskunuzer. **Applied Energy**, 2026.
- [4] *PowerBench: A Benchmark Suite for Monitoring and Security in Distribution Systems*. M. J. Uddin, R. A. Jacob, D. Olojede, J. Zhang, and B. Coskunuzer. **Journal of Data-centric Machine Learning Research (DMLR)**, 2026.
- [5] *SCNode: Spatial and Contextual Coordinates for Graph Representation Learning*. M. J. Uddin, A. Tola, V. Sikand, C. Akcora, and B. Coskunuzer. **Transactions on Machine Learning Research (TMLR)**, 2025.
- [6] *Topology Informed Transformer for Cyber Attack Detection in Grid-Connected PV Systems*. M. J. Uddin, D. Olojede, R. A. Jacob, B. Coskunuzer, and J. Zhang. **IEEE Transactions on Sustainable Energy**, 2025.
- [7] *Cyber Attack Detection in Electric Vehicle Charging Stations Using Topological Data Aided Learning*. M. J. Uddin, R. A. Jacob, J. Wang, B. Coskunuzer, and J. Zhang. **IEEE Power & Energy Society General Meeting (PESGM)**, 2025.
- [8] *OcuViT: A Vision Transformer-Based Approach for Automated Diabetic Retinopathy and AMD Classification*. F. Ahmed and M. J. Uddin. **Journal of Imaging Informatics in Medicine**, 2025.

- [9] *Cyber Attack Detection in Distribution Networks with Topological Data Analytics Aided Learning*. **M. J. Uddin**, D. Olojede, R. A. Jacob, B. Coskunuzer, and J. Zhang. **IEEE Kansas Power and Energy Conference (KPEC)**, 2024.
- [10] *Estimating Option Prices with Discrete Dividend Payment Using Finite Difference Method and Monte Carlo Simulation: A Comparative Study*. **M. J. Uddin**, S. Hossain, A. Hossain, S. Parvin, A. Rahman, and M. H. Sohel. **Journal of Applied Mathematics and Computation**, 6(4), 472–481, 2022.
- [11] *Impact of Horizontal Grid Resolutions for Thunderstorms Simulation over Bangladesh Using WRF-ARW Model*. **M. J. Uddin**, M. A. Samad, and M. A. K. Mallik. **Dhaka University Journal of Science**, 69(1), 43–51, 2021.
- [12] *Track and Landfall Characteristics of Very Severe Cyclonic Storm Fani over the Bay of Bengal Using WRF Model*. S. Hossain, M. A. Samad, R. Sultana, M. A. K. Mallik, and M. J. Uddin. **Dhaka University Journal of Science**, 69(2), 101–108, 2021.

Under Review

- [1] *From Nodes to Pixels: Topological and Structural Two-View Graph Imaging*. M. J. Uddin, S. Changani, S. K. Navuluru, C. Akcora, and B. Coskunuzer. Under review at **NeurIPS**, 2026.
- [2] *Label Encodings: A Missing Channel for Graph Learning*. **M. J. Uddin**, S. K. Navuluru, S. Kumar, S. Lee, and B. Coskunuzer. Under review at **NeurIPS**, 2026.
- [3] *Node Signal Atlas: Characterizing Node Classification Beyond Homophily*. **M. J. Uddin**, S. Lee, and B. Coskunuzer. Under review at **NeurIPS**, 2026.
- [4] *Temporal Graph Transformers for PMU-Based Cyberattack Detection in Power Grids*. **M. J. Uddin**, D. Olojede, K. Hutchison, R. A. Jacob, B. Coskunuzer, and J. Zhang. Under review at **International Conference on Probabilistic Methods Applied to Power Systems (PMAPS)**, 2026.
- [5] *Cross-View Topology-Aware Graph Representation Learning*. A. S. Korkmaz, S. Coskunuzer, and **M. J. Uddin**. Under review at **NeuroComputing**, 2026. *Conducted with two undergraduate students under my supervision.*

Selected Research Projects

Topological Machine Learning for Graph Representation Learning. Developed topology-aware frameworks for graph-level and node-level learning by combining persistent homology, structural descriptors, contextual coordinates, graph neural networks, and transformer architectures.

Temporal Graph Learning with Topological Signals. Designed temporal graph classification models that fuse message-passing representations, topological summaries, spectral descriptors, and attention-based sequence modeling for dynamic networks.

Power Grid Security and Resilience. Built topology-aided learning systems for outage detection, cyberattack detection, EV charging station security, PV system monitoring, and PMU-based power-grid anomaly detection.

Invited Talks and Conference Presentations

Invited Talks

AMS Sectional Meeting

October 3–4, 2026
Washington, D.C.

Upcoming**AMS Southeastern Sectional Meeting**

October 2025
New Orleans, Louisiana

AMS Southeastern Sectional Meeting

October 2025
New Orleans, Louisiana

SIAM Conference

October 2024
Waco, Texas

Topology-Informed Transformer for Cyber Attack Detection in Grid-Connected PV Systems

Special Session on “Artificial Intelligence and Machine Learning Methods in Topological Data Analysis,” The George Washington University

Topological Transformers for Graph Representation Learning

Special Session on “Computational Topology and Geometry in Data Science,” Tulane University

MP-Grid: Detecting Power Grid Outages with Topological Machine Learning

Special Session on “Advances in Applied Topology and Topological Data Analysis,” Tulane University

WISE-GNN: Enhancing GNNs with Wise Embeddings and Topological Encoding

SIAM Conference on Geometric and Topological Approaches in Data Science and Machine Learning, Baylor University

AI Conference Presentations

AAAI 2026

January 2026
Singapore

T3Former: Temporal Graph Classification with Topological Machine Learning

AAAI Conference on Artificial Intelligence

Poster Presentations

ICERM Workshop

May 2026
Providence, Rhode Island

TopoFormer: Topology Meets Attention for Graph Learning

Workshop on Computational Topology, Institute for Computational and Experimental Research in Mathematics, Brown University

ATD–AMPS Joint PI Workshop

October 2024
Washington, D.C.

Enhancing Cyber Attack Detection in Grid-Connected PV Systems: A Topological Machine Learning Approach

Algorithms for Threat Detection and Algorithms for Modern Power Systems Joint PI Workshop

TACCSTER

September 2024
Austin, Texas

WISE-GNN: Enhancing GNNs with Wise Embeddings

Texas Advanced Computing Center, The University of Texas at Austin

ATD–AMPS Joint PI Workshop

October 2023
Fairfax, Virginia

Outage Detection in Power Grids: A Topological Machine Learning Approach

George Mason University

Teaching Experience**Graduate Teaching Assistant**

Department of Mathematical Sciences, The University of Texas at Dallas

Aug. 2021–Present

Richardson, TX

- Courses assisted: Differential Calculus, Applied Calculus I, Calculus II, Calculus of Several Variables, and Linear Algebra.
- Led recitations, graded assignments and exams, supported student learning through office hours, and

assisted course instructors with instructional activities.

Lecturer, Research Track

Department of Applied Mathematics, University of Dhaka

Nov. 2018–Aug. 2021

Dhaka, Bangladesh

- Courses taught: Coordinate and Vector Geometry; Advanced Linear Algebra; Mathematical Methods; Mathematical Modeling in Biology and Physiology.

Lecturer

Department of Mathematics, American International University-Bangladesh

May 2018–Nov. 2018

Dhaka, Bangladesh

- Courses taught: Engineering Mathematics; Ordinary Differential Equations.

Mentoring

- Supervised two undergraduate researchers from Texas A&M University and Virginia Tech on graph classification using topological data analysis and machine learning, UT Dallas, Summer 2025.
- Supervised one undergraduate researcher from UT San Antonio on molecular property prediction using topological machine learning, UT Dallas, Summer 2024.
- Guided four senior-year undergraduate students on a capstone project involving numerical modeling of stock prices, University of Dhaka, 2020.

Honors and Awards

- **First Place**, NSF Algorithms for Modern Power Systems (AMPS) Challenge, 2024.
- **AAAI-26 Scholarship and Volunteer Award**, 2026.
- **A. F. Mujibur Rahman Foundation Gold Medal**, BS in Mathematics, University of Dhaka, 2015.
- **A. F. Mujibur Rahman Foundation Gold Medal**, MS in Applied Mathematics, University of Dhaka, 2016.
- **Dean's Award**, Faculty of Sciences, University of Dhaka, 2015.
- **Swargia Anima Rani Saha Memorial Gold Medal**, University of Dhaka, 2015.
- **University Grants Commission Merit Scholarship**, Bangladesh, 2015.
- **National Science and Technology Fellowship**, Bangladesh, 2016–2017.

Highlighted Coursework

PURE MATHEMATICS	Real Analysis, Functional Analysis, Complex Analysis, Abstract Algebra, Topology, Combinatorics & Graph Theory
APPLIED MATHEMATICS	Numerical Analysis, Scientific Computing, Optimization, Principles & Techniques in Applied Mathematics, Ordinary Differential Equations
STATISTICS	Probability & Statistics for Data Science, Statistical & Machine Learning
COMPUTER SCIENCE	Algorithms & Data Structures, Machine Learning, Big Data Management, Computer Science I

Technical Skills

Programming	Python, C++, Java, R, MATLAB, Fortran, Mathematica.
Machine Learning	PyTorch, PyTorch Geometric, TensorFlow, scikit-learn, XGBoost, graph neural networks, transformers, sequence models.
Topological Data Analysis	Persistent homology, multiparameter persistence, GUDHI, giotto-tda, Ripser, Dionysus.
Data and Computing	NumPy, pandas, NetworkX, SQL/NoSQL, Apache Spark, MLlib, high-performance and cluster computing.
Scientific Computing	Numerical methods, optimization, simulation, data preprocessing, model evaluation, reproducible experimental pipelines.

Professional Service

- Organizer, Mini-symposium at SIAM Texas-Louisiana Section Conference, 2024.
- Member, Organizing Committee, International Mathematics Conference, University of Dhaka, 2019.

Professional Memberships

- Student Member, American Mathematical Society (AMS).
- Student Member, Association for the Advancement of Artificial Intelligence (AAAI).
- Student Member, Institute of Electrical and Electronics Engineers (IEEE).
- Student Member, Society for Industrial and Applied Mathematics (SIAM).
- Member, Bangladesh Mathematical Society (BMS).

Last updated: June 2026.