

Astrit Tola

Florida State University

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Research Interests

- Topological Data Analysis (TDA)
- Applications of TDA (including Drug Discovery)
- Graph Machine Learning
- Graph Representation Learning
- Deep Learning

Work Experience

Florida State University, Postdoctoral Scholar **August 2025 - Current**

- I delivered focused instruction and mentorship in undergraduate mathematics courses while conducting research on graph topologies for efficient synchronization.
- I also independently supervised and guided undergraduate students in research projects.

The University of Texas at Dallas, Teaching Assistant **January 2021 - July 2025**

I provided individualized instruction and academic support in mathematics courses, leading to measurable improvements in student understanding and performance.

The University of Texas at Dallas, Research Assistant **May 2023 - Aug 2023, May 2024 - Aug 2024**

I conducted research in Machine Learning, Topological Data Analysis, Graph Neural Networks, and drug discovery, collaborating with faculty and peers on innovative projects.

Scientific and Technological Research Council of Türkiye (Tubitak), Scholar **Dec 2018 - May 2020**

I performed research on Dynamical Systems and Chaos Theory.

Education

The University of Texas at Dallas, TX, USA **August 2020 - August 2025**

- Dissertation: *Graph Representation Learning with Topological Data Analysis*
- PhD in Mathematics
- Advisor: Baris Coskunuzer

Middle East Technical University, Ankara, Turkey **September 2014 - June 2018**

BS in Mathematics

GRANTS & FUNDING

ReliaQuest Innovation Challenge Award

June 2026 - December 2026

Florida State University

Title: *TopoCorr-KG: Topology-Aware Retrieval and Correlation Across Disparate Cybersecurity Knowledge Graphs*

Role: Principal Investigator (PI)

Co-PI: Malbor Asllani

Supports: 1 Graduate Research Assistant, 1 Undergraduate Research Assistant

Honors and Awards

- NeurIPS Travel Support for the 39th Conference on Neural Information Processing Systems (**NeurIPS**), San Diego, California, 2025
- SIAM Travel Award for SIAM TX–LA Section Conference, Austin, Texas, 2025
- Graduated as an honor student from Middle East Technical University, Ankara, Turkey, 2018
- Merit-Based Tuition Fee Waiver (50%), Middle East Technical University, Ankara, Turkey, 2016–2018

Publications

- A. Tola, MD J. Uddin, C. G. Akcora, B. Coskunuzer (2026). *Topological Transformers for Graph Representation Learning*. International Conference on Learning Representations (**ICLR**)
<https://openreview.net/pdf?id=xanpQt9YZh>.
- A. Tola, S. Aziz, D. Zhabilov, D. Winkler, M. Candas, B. Coskunuzer (2026). *Identification of Molecular Compounds Targeting Bacterial Propionate Metabolism with Topological Machine Learning*. Journal of Molecular Graphics and Modelling, Volume 144, 109287
<https://www.biorxiv.org/content/10.1101/2024.10.26.620439v1>.
- MD J. Uddin, A. Tola, C. G. Akcora, B. Coskunuzer (2025). *SCNode: Spatial and Contextual Coordinates for Graph Representation Learning*. Transactions on Machine Learning Research (**TMLR**),
<https://openreview.net/pdf?id=wdcdKeFbfQ>.
- A. Tola, F. M. Taiwo, C. G. Akcora, B. Coskunuzer (2025). *TopER: Topological Embeddings in Graph Representation Learning*. The 39th Conference on Neural Information Processing Systems (**NeurIPS**),
<https://openreview.net/forum?id=JjTLq7SxaB>.
- A. Tola, J. A. Myrich, B. Coskunuzer (2025). *PROXI: Challenging the GNNs for Link Prediction*. Transactions on Machine Learning Research (**TMLR**), <https://openreview.net/pdf?id=u9EHndbiVw>.
- M. Akhmet, M. O. Fen, A. Tola (2023). *A Numerical Analysis of Poincaré Chaos*. Discontinuity, Nonlinearity, and Complexity, 12(1), 183-195.

- M. Akhmet, M. O. Fen, A. Tola (2022). *Strange Non-Chaotic Attractors with Unpredictable Trajectories*. Journal of Vibration Testing and System Dynamics, 6(3), 317-327, <https://arxiv.org/pdf/2110.15805>.
- M. Akhmet, A. Tola (2020). *Unpredictable Strings*. Kazakh Mathematical Journal, 20(3), 16-22, <https://arxiv.org/pdf/2006.08523>.

Submitted Papers

- A. Tola, S. Kumar, B. Coskunuzer. *DuoLink: A Dual Perspective on Link Prediction via Line Graphs*. Manuscript in preparation.

Presentations

Speaker:

- **TopER: Topological Embeddings in Graph Representation Learning**
FSU/UF Topology & Geometry Meeting 2026, Gainesville, Florida, USA (January 2026).
- **Topological Transformers for Graph Representation Learning**
SIAM TX-LA Section Conference, Austin, Texas, USA (September 2025).
- **TopER: Topological Embeddings in Graph Representation Learning**
SIAM TX-LA Section Conference, Waco, Texas, USA (October 2024).
- **Relative Growth as a Topological Graph Invariant**
UTD Graduate Students Workshop, Dallas, Texas, USA, joined online (December 2023).
- **Relative Growth as a Topological Graph Invariant**
SIAM TX-LA Section Conference, Lafayette, Louisiana, USA (November 2023).

Poster Presenter:

- **TopER: Topological Embeddings in Graph Representation Learning**
The 39th Conference on Neural Information Processing Systems (**NeurIPS 2025**), San Diego, California, USA (December 2025).
- **TopER: Topological Embeddings in Graph Representation Learning**
SIAM Conference on Computational Science and Engineering (CSE25), Fort Worth, Texas, USA (March 2025).
- **TopER: Topological Embeddings in Graph Representation Learning**
TACCSTER, Austin, Texas, USA (September 2024).

Professional Service

Conference reviewer

- ICLR 2026, AAAI 2026, LOG 2025, LOG 2025 Conference - NeurIPS Fast Track, KDD 2024, ACML 2024

Organizer

- Student Organizer, 64th Texas Geometry & Topology Conference, Dallas, Texas, USA (February 2022)

Software Packages

- toper — Python package for *TopER: Topological Embeddings in Graph Representation Learning*; available on PyPi.

Certifications

- Python Data Structures, Coursera
- Programming for Everybody (Getting Started with Python), Coursera

Skills

Technical Skills: Unix, Python, PyTorch, PySpark, Matlab, LaTeX, Microsoft Office, C++, R, Graph Neural Networks, Machine Learning, Topological Data Analysis, SQL (Beginner)

Courses Taught

Florida State University

- MAP 2302, Ordinary Differential Equations, 2025, 2026.
Undergraduate level course (+ 130 students)

UT Dallas

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| - MATH 1314, College Algebra, 2022.
Undergraduate level course (+ 80 students) | - MATH 2420, Differential Equations with
Applications, 2022, 2023, 2024, 2025.
Undergraduate level course (+ 180 students) |
| - MATH 1316, Trigonometry, 2022.
Undergraduate level course (+ 230 students) | - MATH 4301, Mathematical Analysis I, 2022.
Undergraduate level course (49 students) |
| - MATH 2312, Precalculus, 2021.
Undergraduate level course (+ 120 students) | - MATH 4341, Topology, 2021, 2024.
Undergraduate level course (+ 30 students) |
| - MATH 2413, Differential Calculus, 2021.
Undergraduate level course (approx.
1000 students) | - MATH 6310, Topology, 2024.
Graduate level course (23 students) |
| - MATH 2414, Integral Calculus, 2022, 2024.
Undergraduate level course (+ 550 students) | |