Cagatay Ayhan

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ABOUT ME

I am a Ph.D. Candidate in Biomathematics at Florida State University, advised by Tom Needham. My research focuses on both the theory and application of *Topological Data Analysis*.
Looking ahead, I want to continue doing research as a research or data scientist, focusing on how geometric and topological tools can be developed and applied to challenging problems in data science.

EDUCATION

Ph.D. Candidate & M.S. in Biomathematics August 2021 – August 2027
Florida State University, Tallahassee, Florida

- *M.S. Conferred:* Fall 2025
- *GPA*: 3.67/4.0

B.S. in Pure Mathematics July 2015 – June 2021
Ege University, Izmir, Turkey

- *GPA*: 3.70/4.0 (High Honors)
- *Exchange Student:* Studied mathematics for two semesters at the University of Aberdeen, Scotland (Fall 2017, Fall 2018)

PUBLICATIONS

Preprints

- **Cagatay Ayhan**, Audrey N. Nash, Roberto Vincis, Martin Bauer, Richard Bertram, and Tom Needham (2025). *A Persistent Homology Pipeline for the Analysis of Neural Spike Train Data*. arXiv preprint arXiv:2512.08637.
- **Cagatay Ayhan** and Tom Needham (2025). *Equivalence of Landscape and Erosion Distances for Persistence Diagrams*. arXiv preprint arXiv:2506.21488.

PROFESSIONAL EXPERIENCE

Florida State University, Department of Mathematics Fall 2021 – Present
Tallahassee, FL

- *Course Instructor:* MAC2313: Calculus with Analytic Geometry III (Fall 2025)
- *Research Assistant:* Supported by NSF Grant DMS-2324962 (Summer 2025, Fall 2024, Summer 2024)
- *Course Instructor:* MAC2312: Calculus with Analytic Geometry II (Spring 2025)
- *Course Instructor:* MAC2311: Calculus with Analytic Geometry I (Spring 2024)
- *Recitation Instructor:* MAD2104: Discrete Mathematics I (Fall 2023)
- *Lab/Lecture Assistant:* MAC2233: Business Calculus (Summer 2023)
- *Course Instructor:* MAC1140: Precalculus Algebra (Spring 2023)
- *Recitation Instructor:* MAC2311: Calculus with Analytic Geometry I (Fall 2022)
- *Teaching Assistant:* MGF1107, MAC1140, MAC1105 (Summer 2022, Spring 2022)
- *Grader:* MAC3301, MAC2302 (Spring 2022, Fall 2021)
- *Lab Assistant:* MAC2233: Business Calculus (Fall 2021)

PRESENTATIONS

- November 2025 *Equivalence of Landscape and Erosion Distances for Persistence Diagrams*, Talk and Poster Presentation at the Topological Data Analysis Conference 2025, University of Missouri, Columbia, MO
- October 2025 *Equivalence of Landscape and Erosion Distances for Persistence Diagrams*, (Online Talk) ComPer 2025: Workshop on Computational Topology, University at Albany, State University of New York
- September 2025 *Equivalence of Landscape and Erosion Distances for Persistence Diagrams*, FSU Data Science Seminar, Florida State University, Tallahassee, FL
- August 2025 *A Topological Framework for Network Activity*, Poster Presentation at the NITMB Math-Bio Convergence Conference, Chicago, IL
- April 2025 *A Topological Framework for Simultaneously Recorded Network Activity*, Graduate Research Week Flash Talk Competition, Florida State University, Tallahassee, FL
- March 2025 *Topological Optimization Techniques*, Machine Learning/Data Science Seminar, Florida State University, Tallahassee, FL
- March 2024 *TDA in Simultaneously Recorded Neural Spike Train Datasets*, AMS 2024 Spring Southeastern Sectional Meeting, Florida State University, Tallahassee, FL
- November 2023 *Methods in Topological Data Analysis with an Application in Simultaneously Recorded Neural Spike Train Datasets*, ATE (Candidacy) Exam, Florida State University, Tallahassee, FL
- October 2023 *Multiple Neuron Spike Train Data Analysis Using Persistent Homology*, Lightning Talks at ICERM, Brown University Topology and Geometry in Neuroscience Workshop, Providence, RI

CERTIFICATIONS & AWARDS

Awards and Honors

- Dewitt Sumners Flash Talks Competition First Place (Tied), April 2025
- Bettye Anne Bushee Case Graduate Fellowship - Recipient, April 2024
- Outstanding Teaching Assistant Award (OTAA) - Nominated twice, 2023-2024

Certifications

- **August 2025** Certificate of Completion – Data Science Boot Camp, *The Erdős Institute* GitHub Project: Decoding Human Activity
- **May 2024** Certificate of Completion – Data Science Boot Camp, *The Erdős Institute* GitHub Project: Tallahassee Crime Map
- **December 2023** Certificate of Completion – Data Science Boot Camp, *The Erdős Institute* GitHub Project: Near Earth Objects

CONFERENCES AND WORKSHOPS ATTENDED

- Conference on Topological Data Analysis Recent Developments and Applications, Columbia, MO (November 2025)
- NITMB Math Bio Convergence Conference, Chicago, IL (August 2025)
- AMS Mathematics Research Communities: Climate Science at the Interface Between Topological Data Analysis and Dynamical Systems Theory, Buffalo, NY (June 2024)
- AMS 2024 Spring Southeastern Sectional Meeting, Florida State University, Tallahassee, FL (March 2024)

- UF-FSU Topology Meeting, Florida State University, Tallahassee, FL (November 2023)
- Topology and Geometry in Neuroscience Semester Workshop, ICERM, Brown University, Providence, RI (October 2023)

VOLUNTEER EXPERIENCE

- **FSU Math Fun Day Volunteer**
  An annual outreach event by the FSU Department of Mathematics to engage the local community with accessible, hands-on math.
  - Guided activities and explained concepts related to fractal geometry in the "Creating Geometric Patterns" room (Feb 1, 2025).
  - Managed an interactive station and assisted students with puzzles in the "Geometric Constructions" room (March 25, 2023).

PROFESSIONAL SERVICE

- **Co-organizer**, with Tom Needham and Martin Bauer, Special Session on *Geometric Methods for Data Science*, 2026 Spring Southeastern Sectional Meeting of the American Mathematical Society, Georgia Southern University, Armstrong Campus, Savannah, GA, March 28–29, 2026. *Upcoming.*

SKILLS

Technical Skills

- Python (Pandas, Numpy, Scikit-learn)
- LaTeX
- Microsoft Office

Languages

- **Turkish:** Native
- **English:** C2 (Professional Proficiency)

Last updated: January 2, 2026