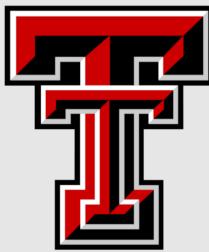


Bradley Vigil

Applied and Computational Topology | Data Science | Mathematical Neuroscience



Research Overview

My interdisciplinary research develops theory and models to understand the mathematical properties and structure of complex systems.

I am particularly interested in interdisciplinary questions regarding biological processes expressing both continuous and network features. My research praxis fuses mathematical modeling, differential equations, computational topology, data science and interdisciplinary collaboration to target challenging problems from epilepsy and neurodegenerative disease to climate change and biodiversity.

Awards and Notoriety

2025-2026 **Doctoral Completion Fellow**

2024-2025 **Quad Fellow (By IIE): TTU Article**

2023-2025 **Charles S. Peirce Fellow**

2023-2024 **Hildebrand Fellow**

2023-2023 **ICERM Travel Grant \$1,145.82**

2021-2026 **Distinguished GRA**

2019-2023 **Presidential Scholar**

2019-2023 **Merit Scholar**

Professional Affiliations

AMA American Mathematical Association

AMS American Mathematical Society

NAM Natl Assoc of Mathematicians

SIAM Soc of Appl and Industrial Mathematics

Contact

✉ bradley.z.vigil@ttu.edu

🌐 *Personal Website*

Texas Tech University

📍 Dept. of Mathematics and Statistics

1108 Memorial Circle

Lubbock, Texas 79409

🎓 Education

2021-2026	Ph.D. Mathematics Texas Tech University <i>Quad Fellow, Hildebrand Graduate Fellow, Peirce Graduate Fellow, Presidential Scholar</i>	📍 Lubbock, Texas
2021-2022	M.Sc. Mathematics Texas Tech University <i>Presidential Scholar, Merit Scholar</i>	📍 Lubbock, Texas
2019-2021	B.Sc. Mathematics Texas Tech University <i>Presidential Scholar, Merit Scholar</i> Minor in Economics	📍 Lubbock, Texas

💡 Academic Appointments

2021-2026	Distinguished Grad. Res. Asst. Texas Tech Graduate College <i>Dept. of Mathematics and Statistics</i> → Applied and Computational Topology, → Data-driven Mathematical Modeling, → Mathematical Neuroscience	📍 Lubbock, Texas
2021-2026	Grad. Instructor <i>Dept. of Mathematics and Statistics</i> → Instructor of record: Calculus II; Ordinary Diff. Eqn. → Offline and online multimodal curriculum → Large lecture leadership experience	📍 Lubbock, Texas

📄 Publications

1. Travis B. Thompson, **Bradley Z. Vigil**, Robert S. Young. *Alzheimer's disease and the mathematical mind.* Brain Multiphysics, 2024, doi.org/10.1016/j.bri.2024.100094.
2. **Bradley Z. Vigil** *On a characterization of discrete homotopy distance.* (Manuscript available upon request, code available → GitHub).
3. **Bradley Z. Vigil**, Shakya Ranasinghe, Anna Solodukina, Travis B. Thompson. *Filtering Complexity: A topological construction for activity and flow across scales.* (In preparation, code available upon request).
4. **Bradley Z. Vigil**, Anna Solodukina, Shakya Ranasinghe, Travis B. Thompson. *Making a complex choice.* (In preparation).
5. Boluwatife Awoyemi, Robert Young, **Bradley Vigil**, Travis Thompson, Komoraiyah Palle, Sharlyn Almodovar, Amanda Laubmeier. *Decoding Cancer's Defenses: Employing data-driven mathematical modeling to decipher cancer resistance.* (Submitted).
6. Travis B. Thompson, Andrew Shin, Boris Decourt, Yifan Wang, **Bradley Vigil**, Anna Solodukina, Shakya Ranasinghe, Robert Young, Vijay Hegde, and Naima Mousaïd-Moussa. *Linking dietary patterns to Alzheimer's disease biomarkers with network mathematical modeling could enable new approach methodologies preventative AD research: A narrative interdisciplinary review.* Frontiers in Nutrition, 2026, doi: 10.3389/fnut.2025.1673533.

Extracurricular Activity

Dream Center (Lubbock, TX)

→ Initiated the development of cooking classes for low economic families designed to provide key insights into how diet is tied to Alzheimer's disease

→ Collaborated with horticulturists to develop lists of healthy and affordable foods that can grow in the climate of the Texas panhandle

Math Circle (Texas Tech Univ.)

→ For middle and high school math students
→ Provides challenging problems
→ Encourages excitement for mathematics

Math Club (Texas Tech Univ.)

→ Discuss grad school applications with undergrads
→ Discuss grad school life with undergrads

Topological Data Analysis Workshops

→ Hosted workshops for faculty and grad students for an introduction to the theory and computational tools for topological data analysis

→ Jupyter notebook available *here* 

Academic Presentations

September, 2025

SIAM TX-LA

 Austin, Texas

Organizer for mini-symposium Title of talk: Getting on Your Nerves: A Restricted View of Intersections
University of Texas (invited)

May, 2025

Quad Fellowship Spring Symposium

 Virtual

Syndemics: An Analysis of Factors Using Machine Learning Techniques - program, code → 
Quad Fellowship

October, 2024

Institute for Studies in Pragmaticism

 Lubbock, Texas

Understanding the Importance of Academic Outreach Across Societies and Cultures. Insights from a young scholar on networking with scientists, technologists, and politicians
Texas Tech University (invited)

October, 2024

SIAM TX-LA

 Waco, Texas

Organizer for mini-symposium Title of talk: Making a Complex Choice
Baylor University (invited)

November, 2023

SIAM TX-LA

 Lafayette, Louisiana

Organizer for mini-symposium Title of talk: Networks, Topology, Data and Pathology
University of Louisiana at Lafayette (invited)

March, 2023

Groups and Dynamics Conference

 Austin, Texas

Dynamics, Dysfunction and Degeneration: The mathematics of Alzheimer's disease
The University of Texas at Austin (accepted)

⚙️ Academic Workshops

August, 2025

The Geometric Realization of AATRN

 Chicago, IL

Institute for Math and Stat Innovation (IMSI): website
University of Chicago (accepted)

October, 2024

The Quad Summit

 Washington, D.C.

Institute of International Education: website
(invited)

April, 2024

Python: Topological Data Analysis II

 Lubbock, TX

Institute for Studies in Pragmaticism
Texas Tech University (organized)

March, 2024

Python: Topological Data Analysis I

 Lubbock, TX

Institute for Studies in Pragmaticism: flyer
Texas Tech University (organized)

October, 2023

Topology and Geometry in Neuroscience

 Providence, RI

Institute for Computational and Experimental Research in Mathematics (ICERM): website
Brown University (accepted)

</> Scientific and Research Computing

Data Science, Machine Learning

Python: Proficient

GUDHI: Journeyman

Tensorflow: Apprentice

Modeling and Simulation

Python : Proficient

Matlab: Proficient

C/C++: Journeyman

Mathematica: Journeyman

Academic Writing

Latex : Proficient