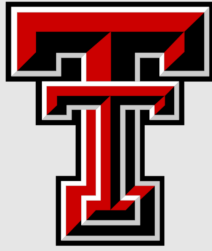


# Bradley Vigil

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](mailto:bradley.z.vigil@ttu.edu)

🌐 **Personal Website**

Texas Tech University  
Dept. of Mathematics and Statistics  
📍 1108 Memorial Circle  
Lubbock, Texas. 79409

## Education

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

## Academic Appointments

2021-2026	<b>Distinguished Grad. Res. Asst.</b> <i>Texas Tech Graduate College</i> <i>Dept. of Mathematics and Statistics</i> → Applied and Computational Topology, → Data-driven Mathematical Modeling, → Mathematical Neuroscience	📍 Lubbock, Texas
2021-2026	<b>Grad. Instructor</b> <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.brain.2024.100094.
2. **Bradley Z. Vigil** *On a characterization of discrete homotopy distance*. (Manuscript available upon request, code available → 📄).
3. **Bradley Z. Vigil**, Shakkya 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, Shakkya Ranasinghe, Travis B. Thompson. *Making a complex choice*. (In preparation).
5. Boluwatife Awoyemi, Robert Young, **Bradley Vigil**, Travis Thompson, Komoraiah Palle, Sharilyn Almodovar, Amanda Laubmeier. *Decoding Cancer's Defenses: Employing data-driven mathematical modeling to decipher cancer resistance..* (In preparation).
6. Travis B. Thompson, Andrew Shin, Boris Decourt, Yifan Wang, **Bradley Vigil**, Anna Solodukina, Shakkya Ranasinghe, Robert Young, Vijay Hegde, and Naima Moustaid-Moussa. *Mouth to Mind: Diet, obesity and mathematical opportunity in Alzheimer's disease research*. (In preparation).

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	<b>SIAM TX-LA</b> <span>📍 Austin, Texas</span> <i>Organizer for mini-symposium Title of talk: Getting on Your Nerves: A Restricted View of Intersections</i> University of Texas (invited)
May, 2025	<b>Quad Fellowship Spring Symposium</b> <span>📍 Virtual</span> <i>Syndemics: An Analysis of Factors Using Machine Learning Techniques - program</i> Quad Fellowship
October, 2024	<b>Institute for Studies in Pragmaticism</b> <span>📍 Lubbock, Texas</span> <i>Understanding the Importance of Academic Outreach Across Societies and Cultures. Insights from a young scholar on networking with scientists, technologists, and politicians</i> Texas Tech University (invited)
October, 2024	<b>SIAM TX-LA</b> <span>📍 Waco, Texas</span> <i>Organizer for mini-symposium Title of talk: Making a Complex Choice</i> Baylor University (invited)
November, 2023	<b>SIAM TX-LA</b> <span>📍 Lafayette, Louisiana</span> <i>Organizer for mini-symposium Title of talk: Networks, Topology, Data and Pathology</i> University of Louisiana at Lafayette (invited)
March, 2023	<b>Groups and Dynamics Conference</b> <span>📍 Austin, Texas</span> <i>Dynamics, Dysfunction and Degeneration: The mathematics of Alzheimer’s disease</i> The University of Texas at Austin (accepted)

Academic Workshops

August, 2025	<b>The Geometric Realization of AATRN</b> <span>📍 Chicago, IL</span> <i>Institute for Math and Stat Innovation (IMSI): website</i> University of Chicago (accepted)
October, 2024	<b>The Quad Summit</b> <span>📍 Washington, D.C.</span> <i>Institute of International Education: website</i> (invited)
April, 2024	<b>Python: Topological Data Analysis II</b> <span>📍 Lubbock, TX</span> <i>Institute for Studies in Pragmaticism</i> Texas Tech University (organized)
March, 2024	<b>Python: Topological Data Analysis I</b> <span>📍 Lubbock, TX</span> <i>Institute for Studies in Pragmaticism: flyer</i> Texas Tech University (organized)
October, 2023	<b>Topology and Geometry in Neuroscience</b> <span>📍 Providence, RI</span> <i>Institute for Computational and Experimental Research in Mathematics (ICERM): website</i> Brown University (accepted)

Scientific and Research Computing

Data Science, Machine Learning	<b>Python:</b> Proficient <b>GUDHI:</b> Journeyman <b>Tensorflow:</b> Apprentice
Modeling and Simulation	<b>Python :</b> Proficient <b>Matlab:</b> Proficient <b>C/C++:</b> Journeyman <b>Mathematica:</b> Journeyman
Academic Writing	<b>Latex :</b> Proficient