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 —

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

2019-2023 Texas Presidential Scholar

2019-2023 Texas Merit Scholar

Professional Affiliations -

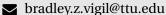
AMA American Mathematical Association

AMS American Mathematical Society

NAM Natl Assoc of Mathematicians

SIAM Soc of Appl and Industrial Mathematics

Contact -



Personal Website **Texas Tech University**

Dept. of Mathematics and Statistics

1108 Memorial Circle Lubbock, Texas. 79409

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2022-	Ph.D. Mathematics	♀ Lubbock, Texas	
Present	Texas Tech University		
	Quad Fellow,		
	Hildebrand Graduate Fellow,		
	Peirce Graduate Fellow, Presidential Scholar		
2021-2022	M.Sc. Mathematics	♀ Lubbock, Texas	
	Texas Tech University		
	Presidential Scholar, Merit Scholar		
2019-2021	B.Sc. Mathematics	♀ Lubbock, Texas	
	Texas Tech University		
	Presidential Scholar, Merit Scholar		
	Minor in Economics		

Academic Appointments

2021-	Distinguished Grad. Res. Asst.	♀ Lubbock, Texas
Present	Texas Tech Graduate College	
	Dept. of Mathematics and Statistics	
	→ Applied and Computational Topology,	
	→ Data-driven Mathematical Modeling,	
	→ Mathematical Neuroscience	
2021-	Grad. Instructor	♀ Lubbock, Texas
Present	Dept. of Mathematics and Statistics	
	→ Instructor of record: Calculus II; Ordinary	y Diff. Eqn.
	→ Offline and online multimodal curriculur	n
	→ Large lecture leadership experience	

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, Travis B. Thompson, Robert S. Young. NPC and GPC reveal *hidden structure in the persistent homology of propagation.* (In preparation).
- 3. Bradley Z. Vigil, Travis B. Thompson, Robert S. Young. Topological data anal*ysis is a choice (function).* (In preparation).
- 4. Robert Young, Naresh Sah, Bradley Vigil, Komoraiah Palle, Sharilyn Almodovar, Yifan Wang, Amanda Laubmeier and Travis Thompson. Decoding Cancer's Defenses: Employing data-driven mathematical modeling to decipher cancer resistance.. (In preparation).
- 5. Travis B. Thompson, Boris Decourt, J. Josh Lawrence, Amanda Laubmeier, Yifan Wang, Bradley Vigil, Robert Young, Eleni Keith, Irkan Khan, Andrew Shin, Vijay Hegde, and Naima Moustaïd-Moussa. Mouth to Mind: Diet, obesity and mathematical opportunity in Alzheimer's disease research. (In preparation).

Bradley **Vigil** Curriculum Vitae

- 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.)

- \rightarrow 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*

ASPCA

→ Aided at the animal shelter by cleaning animal kennels and caring for the animals

Academic Presentations

September, 2025 SIAM TX-LA Organizer for mini-symposium Title of talk: Getting on Your Nerves: A Restricted View of Intersections University of Texas (invited) May, 2025 Ouad Fellowship Spring Symposium Very Virtual

Quad Fellowship Spring Symposium Q Virtual Syndemics: An Analysis of Factors Using Machine Learning

*Techniques - program*Quad Fellowship

October, 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)

Complex Choice
Baylor University (invited)

Topology, Data and Pathology

University of Louisiana at Lafayette (invited)

March, 2023 Groups and Dynamics Conference

One of the property of the prop

ics of Alzheimer's disease

The University of Texas at Austin (accepted)

Academic Workshops

October, 2024	The Quad Summit
April, 2024	Python: Topological Data Analysis II Texas Institute for Studies in Pragmaticism Texas Tech University (organized) Texas Tech University (organized)
March, 2024	Python: Topological Data Analysis I ♥ Lubbock, Texas Institute for Studies in Pragmaticism: flyer Texas Tech University (organized)
October, 2023	Topology and Geometry in Neuroscience ♥ Providence, Rhode Island Institute for Computational and Experimental Research in

</> Scientific and Research Computing

Mathematics (ICERM): website
Brown University (accepted)

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