# **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** -

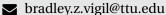
**AMA** American Mathematical Association

**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	<b>♀</b> Lubbock, Texas		
Present	Texas Tech University			
	Quad Fellow,			
	Hildebrand Graduate Fellow,			
	Peirce Graduate Fellow, Presidential Scholar			
2021-2022	M.Sc. Mathematics	<b>♀</b> Lubbock, Texas		
	Texas Tech University			
	Presidential Scholar, Merit Scholar			
2019-2021	B.Sc. Mathematics	<b>♀</b> Lubbock, Texas		
	Texas Tech University			
	Presidential Scholar, Merit Scholar			
	Minor in Economics			

# Academic Appointments

2021-	Distinguished Grad. Res. Asst.	<b>♀</b> 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	<b>♀</b> Lubbock, Texas		
Present	Dept. of Mathematics and Statistics			
	→ Instructor of record: Calculus II; Ordinary Diff. Eqn.			
	→ Offline and online multimodal curriculum			
	→ 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.)

- → 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**

politicians

October, **Institute for Studies in Pragmaticism ♀** Lubbock. 2024 Understanding the Importance of Academic Outreach Across Societies and Cultures. Insights from a young scholar on networking with scientists, technologists, and

Texas Tech University (invited)

October. SIAM TX-LA ♥ Waco, Texas Organizer for mini-symposium Title of talk: Making a 2024

Complex Choice Baylor University (invited)

November, SIAM TX-LA **♀** Lafayette, Louisiana Organizer for mini-symposium Title of talk: Networks, 2023

Topology, Data and Pathology

University of Louisiana at Lafayette (invited)

**April, 2022 Professional Development Seminar ♥** Lubbock, Texas

Vertex Algebras: An introduction to Vertex Operator Alge-

Texas Tech University (invited)

March, 2023 **Groups and Dynamics Conference Q** Austin, Texas

Dynamics, Dysfunction and Degeneration: The mathemat-

ics of Alzheimer's disease

The University of Texas at Austin (accepted)

# **♥** Academic Workshops

October. The Quad Summit **Q** Washington, D.C. Institute of International Education: website 2024

(invited)

**April**, 2024 **Python: Topological Data Analysis II** Q Lubbock.

Institute for Studies in Pragmaticism Texas Tech University (organized)

March, 2024 Python: Topological Data Analysis I Q Lubbock, Texas

Institute for Studies in Pragmaticism: flyer

Texas Tech University (organized)

October, 2023

**Topology and Geometry in Neuroscience** 

dence, Rhode Island

Institute for Computational and Experimental Research in

Mathematics (ICERM): website Brown University (accepted)

# </> Scientific and Research Computing

Data Science, Python: Proficient Machine **GUDHI**: Journeyman Learning Tensorflow: Apprentice

Modeling and Python: Proficient **Simulation** Matlab: Proficient C/C++: Journeyman

Mathematica: Journeyman

Latex : Proficient Academic

Writing