Tobias G. Timofeyev

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Higher Education

University of Vermont — Burlington, VT
Doctoral Program in the Mathematical Sciences — *Aug. 2021–present*

Selected Course Work:

Numerical Analysis · Numerical Differential Equations · Advanced Ordinary Differential Equations · Partial Differential Equations · Convex Optimization · Graph Theory · Chaos and Dynamical Systems · Matroids and Polytopes · Algebraic Topology

Bard College — Annandale-On-Hudson, NY
Bachelor of Arts in Mathematics — *Aug. 2017–May. 2021*

Selected Course Work:

Linear Algebra · Physics I/II · Real Analysis · Complex Analysis · Object Oriented Programming

University College Roosevelt — Middelburg, Netherlands
Semester abroad — *Aug. 2019–Dec. 2019*

Selected Course Work:

Abstract Algebra · Dutch · Classical Mythology · Music Theory

Research Experience

Doctoral Research — Sept 2022 – Present
University of Vermont (Research Advisor Prof. Alice Patania) — *Burlington, VT*

- Relating structure and function in dynamical models with graph theory and algebraic topology
- Applications to Power systems, Climate science and Neuroscience

SCaN Higher-Math Applications for Near Space Network Modeling — June 2024 - Aug. 2024
NASA Goddard Space Flight Center (GSFC) — *Greenbelt, MD*

- (Remote internship) Worked with Dr. Alan Hylton and a team of interns on applying sheaf, category, and hypergraph theory to problems of network routing in space.

Mathematical Sciences Graduate Internship (NSF MSGI) — May 2023 - Aug. 2023
National Renewable Energy Lab (NREL) — *Golden, CO*

- (Remote internship) Worked with Dr. Bai Cui on a Kuramoto - Sakaguchi Inspired Fixed point Algorithm for the AC power flow problem

Senior Thesis — Sept. 2020 – May 2021
Bard College (Research Advisor Prof. Steven Simon) — *Annandale-On-Hudson, NY*

- "Tverberg Type Partitions: Sub-Regular and Elliptical Polygons"
- Received M. Susan Richman Senior Project Prize in Mathematics

2020 Bard Summer Research Institute — July 2020 – Aug. 2020
Bard College (P.I. Prof. Stefan Mendez-Diez) — *Remote*

- Developed open source software in Python for computing Adinkra graphs
- Gained experience in directing mathematical reasoning and deduction towards team based software development

Publications

T. Timofeyev, A. Patania (2025), *Cluster synchronization via graph Laplacian eigenvectors.* Chaos 1 September 2025; 35 (9): 093109. https://doi.org/10.1063/5.0280142

A. Hylton, O. Chiriac, J. Cleveland, J. Hwang, D. Koizumi, K. Petwe, T. Timofeyev (2025), *On the Theory of Network Architectures in the Solar System Internet*, IEEE Aerospace Conference, Big Sky, MT, USA, 2025, pp. 1-20, doi: 10.1109/AERO63441.2025.11068754.

A. Hylton, O. Chiriac, J. Cleveland, J. Hwang, K. Petwe, T. Timofeyev, R. Kassouf-Short (2025), *Towards Practical Clock Synchronization in the Solar System Internet*, IEEE Aerospace Conference, Big Sky, MT, USA, 2025, pp. 1-16, doi: 10.1109/AERO63441.2025.11068429.

S. Simon and T. Timofeyev (2022), *Inscribed Tverberg-type partitions for orbit polytopes. Mathematika*, 68: 1135-1152. https://doi.org/10.1112/mtk.12160

Fellowships and Awards

Graduate Research Fellowship Program (GRFP)
National Science Foundation (NSF) *Sept. 2023 - Present*
- Awarded to pursue my thesis work
- Provides Three full years of funding to work on proposed and related research projects

Nam Sang Kil Scholarship in Mathematics
University of Vermont College of Engineering and Mathematical Sciences *May 2025*
- Presented to an outstanding student studying Mathematics.

M. Susan Richman Senior Project Prize in Mathematics
Bard College *May 2021*
- Presented for senior thesis exhibiting the most mathematical creativity.

Professional Experience

University of Vermont Burlington, VT
Pre-Doctoral Fellow *Aug. 2023 - Present*
- Self directed research position with funding from the GRFP

University of Vermont Burlington, VT
Graduate Teaching Assistantship *Aug. 2021 - May 2023*
- Prepared and presented exams, homework, and multiple lectures a week in the calculus sequence

Presentations

Oral Presentations

"A Sheaf Theoretic Approach to Near Space Network Routing," Netsci, Maastricht, June. 2025

"A Sheaf Theoretic Approach to Near Space Network Modeling," Combinatorics Seminar, University of Vermont, Dec. 2024

"The Role of Graph Partitions in Cluster Synchronization of Weighted Graphs," NetSci, Quebec City, June 2024

"Kuramoto model and Applications," Graduate Student Seminar, University of Vermont, Dec. 2023

"Open Source Software for Computing Adinkras," Women In Math In New England, Online, Oct. 2020

Poster Sessions

"Cluster Synchronization Through the Eigenspectrum of the Graph Laplacian", SIAM Dynamical Systems, US, Denver, May. 2025

"Cluster Synchronization Through the Eigenspectrum of the Graph Laplacian", Dynamics Days US, Denver, Jan. 2025

"Tverberg Type Partitions: Sub-Regular and Elliptical Polygons", Senior Project Poster Session, Bard College, NY, May 2021

"Open Source Software for Computing Adinkras", Bard Virtual Poster Session, Oct. 2020

Workshops Attended

Graduate Research Workshop in Combinatorics (GRWC) June. 2025

Ames, Iowa

- Research workshop meant to foster collaboration between mathematicians, and explore a variety of research areas in Combinatorics
- Close group collaboration, working on algorithmic approaches to finding Kernels in digraphs and conditions for prism hamiltonicity in regular graphs.

AMS Math Research Communities June. 2024

Beaver Hollow, New York

- Climate Science at the Interface Between Topological Data Analysis and Dynamical Systems Theory
- Worked closesly with a group to develop new methods of classifying dynamical systems data with topological data analysis. **I am leading the project from this opportunity, and we hope to publish our findings soon.**

Topology and Geometry in Neuroscience Workshop Oct. 2023

ICERM, Brown University

- Attended numerous presentations interrogating the roles of graph structure and topology in neuronal networks
- Very interested in this interplay between network structure and the available dynamics in network models

Mathematical Challenges in Neuronal Network Dynamics Workshop Sept. 2023

ICERM, Brown University

- Presentations had an emphasis on current research in modeling neuronal dynamics
- Interested in scale and analytical tools in systems modeling

Graduate Student Mathematical Modeling Camp (GSMMC) June 2022

University of Delware

- Collaborated with other Graduate students and Professors in investigating models of snow accretion in clouds
- Gained valuable experience working with applied mathematical models as a piece of a larger project, in a group setting

Mathematical Problems in Industry Workshop (MPI) June 2022

Worcester Polytechnic Institute

- Collaborated with other attendees on a project investigating the limits of machine learning in path optimization
- Learned more about working on a mathematical project in a large group of collaborators

Technical Skills/ Languages

Coding Experience with Matlab, LaTeX, Python, Julia, Java, and Windows Command Line

Linguistic Ability in English (native), German (near native), Russian (heritage speaker), French (good reading skills), and some experience in Dutch after taking an introductory class

Miscellaneous

Service

- Presented an introduction to applied mathematics and combinatorics research at the Vermont State MATHCOUNTS competition (Mar. 2025).

Design Programs

- Large body of Graphic design work in Adobe Photoshop
- Experience in Adobe Illustrator, Autodesk Inventor, Rhinoceros 3D, AutoCad, and Gimp

Cello Performance

- Studied Cello performance since age three
- Played Cello in a number of ensembles throughout his time at Bard College (2017-2021)
- Has participated in and helped creatively direct a number of educational and slightly humorous baroque music videos on YouTube (2020-2021)