

# Nikolas Schonsheck — Curriculum Vitæ

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## Education & Employment

### University of Delaware

Postdoctoral Fellow July 2021-present  
PI: Chad Giusti

### The Ohio State University

Ph.D. in Mathematics May 2021  
M.S. in Mathematics December 2018  
Supervisor: John E. Harper

### Vassar College

B.A. in Mathematics, general and subject honors May 2015  
Minor in social and political philosophy

## Teaching Experience

### *University of Delaware*

#### Instructor

Math 367: Applied Topology Spring 2023  
Math 349: Elementary Linear Algebra Fall 2022  
Math 401: Introduction to Analysis Spring 2022

### *The Ohio State University*

#### Instructor

Math 1149: Trigonometry Summer 2018

#### Co-instructor

Math 1125: Mathematics for Elementary Teachers I Fall 2019  
Math 1149: Trigonometry Summer 2017

#### Graduate Teaching Associate

Regular duties included planning material for and conducting two recitation meetings per week, writing and grading quizzes, grading homework.

Math 1150: Precalculus Fall 2020  
Math 1161: Accelerated Calculus I Fall 2018, Fall 2017  
Math 1151: Calculus I Spring 2018, Fall 2016  
Spring 2016, Fall 2015  
Math 1152: Calculus II Spring 2017

### *Vassar College*

#### Undergraduate Assistant

Held six office hours per week for upper-level mathematics classes. Fall 2014-Spring 2015

## Papers

**Spherical coordinates from persistent cohomology** (with S. Schonsheck). Submitted. Available at <https://arxiv.org/pdf/2209.02791.pdf>.

**Toroidal coordinates: decorrelating circular coordinates with lattice reduction** (with J. Bush, H. Gakhar, J. Perea, T. Rask, L. Scozzola, L. Zhou). Submitted.

**On the chromatic localization of the homotopy completion tower for  $O$ -algebras** (with C. Ogle). New York Journal of Mathematics **28** 1042-1056 (2022).

**TQ-completion and the Taylor tower of the identity functor**. Journal of Homotopy and Related Structures, **17**, 201-216 (2022).

**Fibration theorems for TQ-completion of structured ring spectra**. Tbilisi Math. Journal: Special Issue on Homotopy Theory, Spectra, and Structured Ring Spectra (2020).

**On the cop number of generalized Petersen graphs** (with T. Ball, R. Bell, J. Guzman, and M. Hanson-Colvin.) Discrete Mathematics, 340 (2017), no.6, 1381-1388.

*In preparation*

**Equivariant dimensionality reduction on Stiefel manifolds** (with A. Lee, H. Lee, J. Perea, M. Weinstein).

## Research Mentoring and Service

**GEMS Summer Program** Summer 2022-present  
Summer research program at University of Delaware; supervisor to one undergraduate and one graduate student studying propagation of cyclical data features through feedforward neural networks.

**Directed Reading Program** (University of Delaware) Spring 2022-present  
Cofounded and continue to organize Directed Reading Program at University of Delaware; supervised reading projects on simplicial homology and elementary number theory.

**Knots and Graphs undergraduate research working group** Summer 2020  
Summer research program similar to an REU but only open to Ohio State students; volunteered to mentor two groups of four undergraduate students working on problems in graph coloring.

**Directed Reading Program** (Ohio State) Spring 2019  
Oversaw a reading course on introductory algebraic topology while a graduate student at Ohio State.

## Honors, Awards, & Fellowships

*Teaching*

**Phil Huneke Distinguished Graduate Teaching Associate Award** Spring 2021  
Departmental. This award recognizes “mathematics graduate students who have demonstrated excellence in the classroom and a high level of commitment to undergraduate mathematics education.” Awarded for the 2019-2020 academic year, but awards delayed to 2021 due to the COVID-19 pandemic.

**Graduate Associate Teaching Award** Spring 2020  
University-wide. “Ohio State’s highest recognition of teaching done by graduate students.” Ten recipients chosen each year out of over 3,000 graduate TA’s.

**First-year Graduate Teaching Associate Award**

Spring 2016

Departmental. “This award recognizes outstanding first year Graduate Teaching Associates within the OSU Department of Mathematics.”

*Research & Scholarship***Research Training Groups (RTG) Fellowship**

Summer 2020, Spring 2020

Department of Mathematics, The Ohio State University

Spring 2019

**Mary Evelyn Wells and Gertrude Smith Prize**

Spring 2011

Department of Mathematics, Vassar College

**Other Service and Activities****JMM Special Session**

January 2023

**Applied Topology: Theory and Implementation**

Co-organized special session on applied topology with a particular view towards bridging the gap between the theory and implementation of recent research in applied topology and topological data analysis. To run in January of 2023.

**AMS Mathematics Research Communities**

Summer 2022

Participant in MRC: Data Science at the Crossroads of Analysis, Geometry, and Topology. Worked with two groups of other early career researchers on projects in topological data analysis. Projects are ongoing and in preparation to submit for publication.

**Addressing Barriers to Participation in STEM**

Fall 2021-present

Member, committee of University of Delaware Anti-Racism Initiative. Activities have included developing materials for holistic admission processes, lobbying for required diversity and inclusion questions in faculty hiring, and successfully advocating the raise of minimum graduate student stipend.

**Invited Panelist, AWM Chapter at Marian University**

Spring 2021

Served as a panelist for a discussion on transitioning from an undergraduate liberal arts school to graduate school/industry in STEM fields.

**Buckeye Aha! Math Moments**

Summer 2020

Volunteered to mentor and review student work for this outreach initiative of the Department of Mathematics at OSU.

**Mentor for TA training**

Summer 2020, 2019, 2018, 2017

Assisted in summer training of incoming TA's at Ohio State.

**TA Peer mentor**

Fall 2019, 2018, 2017, 2016

Served in the peer-mentoring program for new TA's at Ohio state; oversaw a total of 14 new teaching associates.

**Conferences & Research Talks***Invited and contributed talks***Geometry-Topology Seminar, Oregon State University**

October 2022

“Spherical coordinates from persistent cohomology”

**Topology Seminar, University of Iowa**

April 2021

“Fibration theorems, functor calculus, and chromatic connections in  $O$ -algebras”

**Graduate Student Topology and Geometry Conference, Indiana University**

April 2021

“Functor calculus and chromatic connections in  $O$ -algebras”

**Topology Seminar, University of Regina**

January 2021

“Fibration theorems, functor calculus, and chromatic connections in  $O$ -algebras”

<b>Graduate Conference in Algebra and Topology, Binghamton University</b> “TQ-completion: fibration theorems and connections to functor calculus”	November 2020
<b>Algebraic Topology Seminar, UCLA</b> “Fibration theorems and functor calculus for structured ring spectra”	October 2020
<b>Topology Seminar, Pennsylvania State University-Altoona</b> “TQ-completion: fibration theorems and connections to functor calculus”	September 2020
<b>Topology Seminar, University of Virginia</b> “TQ-completion: fibration theorems and connections to functor calculus”	September 2020
<b>AMS Sectional Special Session on Homotopy Theory, University of Virginia</b> “TQ-completion of certain fibration sequences” (This conference was canceled due to the COVID-19 pandemic; notes available at <a href="http://people.virginia.edu/~jeb2md/Schonsheck2020.pdf">http://people.virginia.edu/~jeb2md/Schonsheck2020.pdf</a> )	March 2020
<b>Young Topologists Meeting, EPFL, Switzerland</b> “Topological Quillen homology of structured ring spectra”	July 2019
<b>Mathematics Colloquium, Vassar College</b> “Homotopy theory—from the fundamental group to structured ring spectra”	February 2019
<b>Young Topologists Meeting, University of Copenhagen</b> “An introduction to symmetric spectra”	July 2018

### *Informal talks*

<b>GOATS 2 Online Mini-Conference</b> “Fibration Theorems for TQ-completion of structured ring spectra” (Available at <a href="https://youtu.be/NZ71N1-CUZQ">https://youtu.be/NZ71N1-CUZQ</a> )	June 2020
<b>GROOT Summer Seminar, online</b> “Fibration Theorems for TQ-completion of structured ring spectra” (Available at <a href="https://youtu.be/DkjCgY1kjF8">https://youtu.be/DkjCgY1kjF8</a> and <a href="https://youtu.be/EUAh8fwjF9M">https://youtu.be/EUAh8fwjF9M</a> )	May 2020
<b>Student Homotopy Seminar, Ohio State Mathematics Department</b> “Pro-nilpotent homology types” “Fibration theorems for TQ-completion of structured ring spectra” “Long homology localization towers” “Localization and completion with respect to topological Quillen homology” “Cosimplicial resolution model structures” “The role of principal fibrations” “Completion of spaces and ring spectra with respect to homology” “Operads and the recognition principle” “Comparing $H\mathbb{Z}$ -algebras in $Sp^\Sigma$ to unbounded chain complexes” “Why symmetric spectra?”	2018-2020
<b>Graduate Student Seminar, Ohio State Mathematics Department</b> “Homotopy theory—from the fundamental group to structured ring spectra”	January 2019
<b>Seminar-<math>\infty</math>, Ohio State Mathematics Department</b> “The Dold-Kan Correspondence” “Eilenberg-Zilber and geometric realization”	Fall 2017
<b>Various Presentations</b> “The game of Cops and Robbers on graphs”	2014-2015

*Conference participation*

<b>Algebraic Topology and Topological Data Analysis: A Conference in Honor of Gunnar Carlsson Institute for Mathematics and its Applications, University of Minnesota</b>	August 2022
<b>Mathematics Research Communities: Data Science at the Crossroads of Analysis, Geometry, and Topology American Mathematical Society, Beaver Hollow, NY</b>	June 2022
<b>Hot Topics Workshop: Topological and Dynamical Analysis of Brain Connectomes ICERM, Brown University</b>	May 2022
<b>COSYNE: Computational Systems Neuroscience Lisbon, Portugal</b>	March 2022
<b>Graduate Student Topology and Geometry Conference, Indiana University</b>	April 2021
<b>Graduate Conference in Algebra and Topology, Binghamton University</b>	November 2020
<b>Midwest Topology Seminar, Virtual, Wayne State University</b>	October 2020
<b>GOATS 2 Online Mini-Conference</b>	June 2020
<b>AMS Sectional Meeting, University of Wisconsin-Madison</b>	September 2019
<b>Young Topologists Meeting, EPFL, Switzerland</b>	July 2019
<b>Midwest Topology Seminar, Michigan State University</b>	May 2019
<b>Graduate Student Topology and Geometry Conference, UIUC</b>	March 2019
<b>Functor Calculus Workshop, Ohio State University</b>	March 2019
<b>Midwest Topology Seminar, University of Kentucky</b>	September 2018
<b>Young Topologists Meeting, University of Copenhagen</b>	July 2018
<b>Midwest Topology Seminar, Indiana University</b>	April 2018
<b>AMS Sectional Meeting, Ohio State University</b>	March 2018
<b>Midwest Topology Seminar, Northwestern University</b>	March 2018
<b>Midwest Topology Seminar, Wayne State University</b>	November 2017
<b>Homotopy theory: tools and applications, UIUC</b>	July 2017