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## JUSTIN M. CURRY

### education

Ph.D, Mathematics, University of Pennsylvania, awarded May 19, 2014.

Dissertation: *Sheaves, Cosheaves and Applications*. 307 pages. 68 figures.

Available as <https://arxiv.org/abs/1303.3255>

Advisor: **Robert Ghrist**

Visiting Associate, Institute for Advanced Study, 2012–2014.

Mentor: **Robert MacPherson**

Exchange Scholar, Princeton University, 2011–2012.

Mentor: **Amit Singer**

B.S., Mathematics, Massachusetts Institute of Technology, awarded June 6, 2008.

Thesis Equivalent: *Soliton Solutions to Integrable Systems and Hirota's Method*

Available as <http://justinmcurry.com/wp-content/uploads/2017/01/soliton.pdf>

Mentors: **Aliaa Barakat** and **Haynes Miller**

Cambridge-MIT Exchange, Churchill College at Cambridge University, 2006–2007.

Sat for and awarded (unofficial) first class honours for the *Part IB Tripos in Mathematics*

Mentors: **Colmille Caulfield** and **Christopher Tout**

### appointments

Associate Professor of Mathematics, University at Albany SUNY, 2023–present.

*Promotion with tenure official as of September 1st, 2023.*

Assistant Professor of Mathematics, University at Albany SUNY, 2017–2023.

Mentor: **Boris Goldfarb**

Visiting Assistant Professor in Mathematics, Duke University, 2014–2017.

Mentors: **John Harer**, **Ezra Miller**, **Sayan Mukherjee**

Research Fellow for Semester Program *Topology in Motion* at ICERM, Fall 2016.

### federal grants

### & contracts

**\$537,019** (total) NASA Glenn Research Center Contract

*TIMAEUS: Topologically-Influenced Methods for Ad hoc, Evolving and Uncertain Systems.*

8/1/2020–11/31/2024

PI: **Justin M. Curry**

**\$174,074** (total) NSF Division of Computing and Communication Foundations (CCF)

*CRII: AF: Enriched Topological Summaries for Inverse Problems.*

7/1/2019–6/30/2021

PI: **Justin M. Curry**

- other external grants**      **\$40,000** (direct) Institute for Mathematics and its Applications (IMA)  
 Funds for organizing Special Workshop *Bridging Statistics and Sheaves*  
 5/21/2018–5/25/2018, cf. <https://www.ima.umn.edu/2017-2018/SW5.21-25.18>  
 PI: **Justin M. Curry**
- awards**      Nominated for the *Torch Faculty/Student Engagement Award* at UAlbany in 2022.  
 Awarded a *Postdoc Mobility Grant* by the Technische Universität München in 2016.  
 Awarded a *Good Teaching Award* by the University of Pennsylvania in 2011.
- programming**      Competent with Python, L<sup>A</sup>T<sub>E</sub>X, HTML; Experience with Matlab and Scheme.
- publication summary**      **I have written 29 articles, with an additional 7 in preparation.**  
**Author order is typically alphabetical.**  
**(§) and (¶) indicates student and postdoc status.**
- articles in preparation**      **Some drafts are available on request.**
- P7. Justin Curry and Jordan deSha (§). *Counting Spheres with the Same Persistence.*
- P6. Justin Curry, Jordan deSha (§), Marquia Williams (§). *Counting and Decomposing Reeb Graphs via Barcodes.*
- P5. Justin Curry and Robert Green. *A Categorical Perspective on the WL Test.*
- P4. William Bernardoni, Robert Cardona, Justin Curry, Alan Hylton, Robert Kassouf-Short, Brendan Mallery. *Temporal Distance and Curvature for Time-Varying Network Segmentation.*
- P3. William Bernardoni, Justin Curry, Brian Heller, Robert Kassouf-Short, and David Spivak. *Enriched Contact Networks.*
- P2. Henry Ashley (§), Håvard Bakke Bjerkevik (¶), Justin Curry, Riley Decker (§), Robby Green (§). *Barcode Counting for Betti Curves.*
- P1. Justin Curry, Ryan Gelnett (§), Matthew C.B. Zaremsky. *The Topology of Configurations of Circles.*
- submitted articles**      **Number indicates order of submission.**
- S3. *Functors on Posets Kan Extend to Cosheaves* by Justin Curry. 10 pages.  
 Erratum for JPAA article.  
 Available as <https://arxiv.org/abs/1907.09416>.

- S2. *A Relative Theory of Interleavings* by Magnus Botnan, Justin Curry and Elizabeth Munch. 50 pages.

Submitted to JACT on May 13, 2020. Revisions requested on February 4th, 2021.

Available as <https://arxiv.org/abs/2004.14286>.

- S1. *Algebraic and Geometric Models for Space Networking* by William Bernardoni (§), Robert Cardona (¶), Jacob Cleveland (§), Justin Curry, Robert Green (§), Brian Heller (§), Alan Hylton, Tung Lam (§), Robert Kassouf-Short. 43 pages, 18 figures.

Available as <https://arxiv.org/abs/2304.01150>.

journal  
articles

**Author order is alphabetical.**

- J10. *A Sheaf-Theoretic Construction of Shape Space* by Shreya Arya (§), Justin Curry, Sayan Mukherjee. 45 pages, 11 figures.

Published on May 16, 2024 in *Foundations of Computational Mathematics* (FoCM).

Available as <https://link.springer.com/article/10.1007/s10208-024-09650-1>.

- J9. *From Trees to Barcodes and Back Again II: Combinatorial and Probabilistic Aspects of a Topological Inverse Problem* by Justin Curry, Jordan DeSha, Adélie Garin, Kathryn Hess, Lida Kanari, and Brendan Mallery (§). 39 pages, 17 figures.

Accepted on June 9, 2023. *Computational Geometry: Theory and Applications* (CGTA).

Available as <https://arxiv.org/abs/2107.11212>.

- J8. *How Many Directions Determine a Shape and other Sufficiency Results for Two Topological Transforms* by Justin Curry, Sayan Mukherjee and Katharine Turner. 38 pages.

Accepted on April 27, 2022. *Transactions of the American Mathematical Society* (TAMS).

Available as <https://arxiv.org/abs/1805.09782>.

- J7. *Decorated Merge Trees for Persistent Topology* by Justin Curry, Haibin Hang (¶), Washington Mio, Tom Needham, Osman Okutan (¶). 58 pages.

March 26, 2022. *Journal of Applied and Computational Topology* (JACT).

Available as <https://arxiv.org/abs/2103.15804>

- J6. *Moduli Spaces of Morse Functions for Persistence* by Mike Catanzaro, Justin Curry, Brittany Fasy, Jānis Lazovskis (¶), Greg Malen, Hans Reiss (§), Bei Wang, Matthew Zabka. 33 pages.

June 27, 2020. *Journal of Applied and Computational Topology* (JACT).

Available as <https://rdcu.be/b5hA9>

- J5. *Classification of Constructible Cosheaves* Justin Curry and Amit Patel. 36 pages.  
 June 24, 2020. Theory and Applications of Categories (TAC).  
 Available as <http://www.tac.mta.ca/tac/volumes/35/27/35-27abs.html>
- J4. *The Fiber of the Persistence Map for Functions on the Interval* by Justin Curry. 21 pages.  
 February 7, 2019. Journal of Applied and Computational Topology (JACT).  
 Available as <https://arxiv.org/abs/1706.06059>
- J3. *Dualities between Cellular Sheaves and Cosheaves* Justin Curry (¶). 28 pages. June 27, 2017. Journal of Pure and Applied Algebra (JPAA).  
 Available as <https://arxiv.org/abs/1607.06942>.
- J2. *Discrete Morse Theory for Computing Cellular Sheaf Cohomology* by Justin Curry (¶), Robert Ghrist and Vidit Nanda (¶). 24 pages.  
 June 20, 2015. Foundations of Computational Mathematics (FoCM).  
 Available as <http://arxiv.org/abs/1312.6454>.
- J1. *Topological Data Analysis and Cosheaves* by Justin Curry (¶). 39 pages.  
 June 18, 2015. Japan Journal of Industrial and Applied Mathematics (JJIAM).  
 Available as <http://arxiv.org/abs/1411.0613>.

conference  
papers

**Author order is a mixture of alphabetical, institutional and individual effort.**

- C11. *Stability and Approximations for Decorated Reeb Spaces* by Justin Curry, Washington Mio, Tom Needham, Osman Berat Okutan, and Florian Russold. 17 pages.  
 Accepted February 5, 2024 and published June 6th, 2024 as part of the 40th International Symposium on Computational Geometry (SoCG), held in Athens, Greece.
- C10. *Position: Topological Deep Learning is the New Frontier for Relational Learning* by Theodore Papamarkou, Tolga Birdal, Michael Bronstein, Gunnar Carlsson, Justin Curry, Yue Gao, Mustafa Hajij, Roland Kwitt, Pietro Liò, Paolo Di Lorenzo, Vasileios Maroulas, Nina Miolane, Farzana Nasrin, Karthikeyan Natesan Ramamurthy, Bastian Rieck, Simone Scardapane, Michael T. Schaub, Petar Veličković, Bei Wang, Yusu Wang, Guo-Wei Wei, Ghada Zamzmi. 27 pages = 9 pages + 18 pages of references and supplemental material.  
 Accepted May 1, 2024 and published June 1, 2024 as part of the 41st International Conference on Machine Learning (ICML) to held in Vienna, Austria.

- C9. *Network Storage Analysis via Semiring Geometry* by William Bernardoni, Robert Kassouf-Short, Robert Cardona, Brian Heller, Justin Curry, David Spivak, Juan A. Fraire. 19 pages.

Accepted November 13, 2023 and published March 2, 2024 as as part of the 45th International IEEE Aerospace Conference held in Big Sky, MT.

- C8. *A Proposed Clock Synchronization Method for the Solar System Internet* by Michael Moy, Alan Hylton, Robert Kassouf-Short, Jacob Cleveland, Jihun Hwang, Justin Curry, Mark Ronnenberg, Miguel Lopez, and Oliver Chiriac. 17 pages.

Accepted November 13, 2023 and published March 2, 2024 as part of the 45th International IEEE Aerospace Conference held in Big Sky, MT.

- C7. *Topologically Attributed Graphs for Shape Discrimination* by Justin Curry, Washington Mio, Tom Needham, Osman Okutan (¶), and Florian Russold (§). 14 pages = 9 pages + references and supplemental section, 4 figures.

Accepted June 18, 2023 to the Workshop on Topology, Algebra, and Geometry in Machine Learning (TAGML) as part of the 40th International Conference on Machine Learning (ICML).

**Selected as one of only four oral presentations for this workshop.**

Available as <https://openreview.net/pdf?id=qLV1wgJzhG>.

- C6. *Towards Time Synchronization in the Solar System Internet* by Alan Hylton, Natalie Tsuei (§), Mark Ronnenberg (§), Jihuan Hwang (§), Brendan Mallery (§), Jonathan Quartin (§), Colin Levaunt (§), Jeremy Quail (§), and Justin Curry. 19 pages, 10 figures.

Accepted to AeroConf 2023. Copy available on request.

- C5. *Contact Multigraph Routing: Overview and Implementation* by Michael Moy (§), Robert Short, Nadia Kortas, Jacob Cleveland (§), Dominic Conricode (§), Yael Kirkpatrick (§), Robert Cardona (§), Brian Heller (§) and Justin Curry. 8 pages, 4 figures.

Accepted to AeroConf 2023. Copy available on request.

- C4. *The Universal  $\ell^p$ -Metric on Merge Trees* by Robert Cardona (§), Justin Curry, Tung Lam (§), Michael Lesnick. 20 pages.

February 9, 2022. 38th International Symposium on Computational Geometry (SoCG).

Available as <http://arxiv.org/abs/2112.12165>.

- C3. *Sheaf Theoretic Models for Routing in Delay Tolerant Networks* by Robert Short, Alan Hylton, Jacob Cleveland (§), Michael Moy (§), Robert Cardona (§), Robert Green

(§), Justin Curry, Brendan Mallery (§), Gabriel Bainbridge (§), Zander Memon (§). 19 pages.

Accepted on November 16, 2021. AeroConf 2022.

Available as <https://ntrs.nasa.gov/citations/20220002277>.

C2. *A Survey of Mathematical Structures for Lunar Networks* by Alan Hylton, Robert Short, Jacob Cleveland (§), Olivia Freides (§), Zander Memon (§), Robert Cardona (§), Robert Green (§), Justin Curry, Sriram Gopalakrishnan, Devavrat Vivek Dabke (§), Brittany Story (§), Michael Moy (§), Brendan Mallery (§). 17 pages.

Accepted on November 16, 2021. AeroConf 2022.

Available as <https://ntrs.nasa.gov/citations/20220003566>.

C1. *Introducing Tropical Geometric Approaches to Delay Tolerant Networking Optimization* by Jacob Cleveland, Alan Hylton, Robert Short, Brendan Mallery (§), Robert Green (§), Justin Curry, Devavrat Vivek Dabke (§), Olivia Freides (§). 11 pages.

Accepted on November 16, 2021. AeroConf 2022.

Available as <https://ntrs.nasa.gov/citations/20220003679>.

published  
abstracts

#### **A1 author order by effort, others by alphabetical ordering.**

A2. *Convergence of Leray Cosheaves for Decorated Mapper Graphs* by Justin Curry, Washington Mio, Tom Needham, Osman Okutan (¶), and Florian Russold (§). 6 pages, 2 figures.

April 18, 2023. Young Researchers Forum (YRF) of the 39th International Symposium on Computational Geometry (SoCG).

Available as <https://arxiv.org/abs/2303.00130>.

A1. *A Lattice-Theoretic Perspective on the Persistence Map* by Brendan Mallery (§), Adélie Garin (§), Justin Curry. 4 pages.

April 11, 2022. Young Researchers Forum (YRF) of the 38th International Symposium on Computational Geometry (SoCG).

Available as <https://arxiv.org/abs/2203.00643>.

survey  
articles

#### **Author order is alphabetical.**

R2. *Euler Calculus with Applications to Signals and Sensing* by Justin Curry (§), Robert Ghrist and Michael Robinson (¶). 71 pages.

February 1, 2012. Proceedings of Symposia in Applied Mathematics Vol. 70. pp. 75-146.

Available as <http://arxiv.org/abs/1202.0275>.

R1. *Soliton Solutions of Integrable Systems and Hirota's Method* by Justin Curry (§). 16 pages.

Published in Harvard College Mathematics Review Vol. 2, No. 1, Spring 2008, pp. 43-59

Available as <http://justinmcurry.com/wp-content/uploads/2017/01/soliton.pdf>.

service  
articles

**Author order is based on ownership and conception.**

H1. *Mental Health in the Mathematics Community* by Mikael Vejdemo-Johansson, Justin Curry and Julie Corrigan. 6 pages.

August 2019. Notices of the American Mathematical Society. Vol. 66, No. 7, pp. 1079-1084.

Available as <https://www.ams.org/journals/notices/201907/rnoti-p1079.pdf>.

other  
media

O2. Referee, consultant, and provider of jacket review for Daniel Rosiak's *Sheaf Theory Through Examples*. Published by MIT Press. October 25, 2022.

Available as <http://mitpress.mit.edu/9780262542159>

O1. Blog interview for *Scientific American: Roots of Unity*.

Available as <http://blogs.scientificamerican.com/roots-of-unity/justin-currys-favorite-theorem>

students  
mentored

**Nota Bene: Reverse-ordered by graduation date, expected or actual.**

(∅) Indicates Ph.D. students who have graduated and where I was chair or co-chair.

Brian Heller, Ph.D. student, University at Albany SUNY, 06/2022–Present.

**Supervisor on Contract Work.** Brian is performing SOAP simulations for my NASA contract.

Robby Green, Ph.D. student, University at Albany SUNY, 09/2020–Present.

**Chair of Thesis Committee.** Robby is a fifth year PhD student.

Tung Lam, Ph.D. student, University at Albany SUNY, 06/2020–Present.

**Co-Chair of Thesis Committee with Mike Lesnick.** Tung is a fourth year PhD student.

(∅) Robert Cardona, Ph.D. student, University at Albany SUNY, 09/2018–08/2023.

**Co-Chaired Thesis Committee with Mike Lesnick.**

Dissertation: *Variations and Approximations of Interleaving Distances*.

Current Position: Postdoctoral Associate at UAlbany

Doug Lenseth, Ph.D. student, University at Albany SUNY, 04/2018–04/2022.

**Member of Thesis Committee.**

Dissertation: *Stubbornly Merging Discrete Vector Fields*

Brendan Mallery, RF Employee, University at Albany SUNY, 2020–2021 & Sp22.

**Supervisor on Contract Work.** Brendan was employed as a freelance researcher under my NASA contract. Brendan is now a PhD student at Tufts University.

Nicolas Carrara, Ph.D. student, University at Albany SUNY, 09/2018–06/2021.

**Member of Thesis Committee.**

Dissertation: *The Foundations of Inference and its Application to Fundamental Physics*.

Current Position: Postdoc at UC Davis.

(∅) Jordan DeSha, Ph.D. student, University at Albany SUNY, 08/2018–05/2021.

**Chaired Thesis Committee.**

Dissertation: *Inverse Problems for Topological Summaries in Topological Data Analysis*.

Current Position: Software Developer at The Mailworks

Nicolas Berkouk, Ph.D. student, École Polytechnique – INRIA Saclay, 03/2017–09/2020.

**Mentor and External Jury Member.** Nicolas was a PhD student of Steve Oudot in Paris. I mentored one key project for his thesis and served as an external thesis jury member for his defense in September 2020. He is now a post-doc at EPFL under Kathryn Hess.

Jānis Lazovskis, Ph.D. student, University of Illinois at Chicago, 05/2018–05/2019.

**Served as Outside Member of Thesis Committee.** Jānis’s thesis work creates a universal model for persistent homology of configurations of point clouds and uses ideas from my thesis.

(∅) Anastasios Stefanou, Ph.D. student, University at Albany SUNY, 08/2017–08/2018.

**Co-Chaired Thesis Committee with Elizabeth Munch.**

Dissertation: *Dynamics on Categories and Applications*.

Current Position: Assistant Professor (W1) at the University of Bremen

conference  
talks

**Talks with a (†) were cancelled due to the COVID-19 pandemic.**

**Talks with a (★) were delivered online due to the COVID-19 pandemic.**

**(🗨️) Indicates a keynote address.**

“Inverse Problems in Topological Data Analysis” 45-minute presentation at the Fall Eastern Sectional Meeting of the AMS in Buffalo, NY. September 10, 2023.

“Modeling Space Internet with AI” Lightning Talk at the University at Albany Inaugural AI Symposium. November 21, 2022.

“The Universal  $\ell^p$ -Metric on Merge Trees” Conference Paper Presentation at the 38th International Symposium on Computational Geometry (SoCG) in Berlin, Germany. June 10, 2022. <https://youtu.be/C1hml2Cn3uA?t=1521>

(★) “Decorated Merge Trees for Persistent Topology.” Invited talk at the Western Sectional Meeting of the AMS. May 15, 2022.

(★) “Advancing the Theory of TDA.” Invited panel discussion with Leland McInnes and Bei Wang at SIAM Data Mining 2022. April 28, 2022. <https://sites.google.com/view/tdaworkshopatsdm22/home>

(🗨️) “Exemplars of Sheaf Theory in TDA.” University of Florida TDA Meeting 2022. January 21, 2022. <https://people.clas.ufl.edu/peterbubenik/uftda2022/>



- (★) “Decorated Merge Trees for Persistence.” Joint Math Meeting, AMS Special Session on Combinatorial Approaches to Topological Structures and Applications. Washington D.C. January 9, 2021.
- (★) “Counting Problems in Persistence.” Joint Math Meeting, AMS Special Session on Applied Topology. Washington D.C. January 8, 2021.
- ( $\mathcal{Q}, \dagger$ ) Invited Plenary Lecture at VBAC 2020: Integral functors, finite spaces and Krichever-Novikov algebras. University of Salamanca, Salamanca, Spain. July 17, 2020.
- (★) “Counting Embedded Spheres with the Same Persistence.” Invited presentation at the Fields Institute for Research in the Mathematical Sciences. June 15, 2020.
- ( $\mathcal{Q}, \dagger$ ) “Refining Persistence.” Invited Plenary Lecture for the Georgia Topology Conference at UGA. June 5, 2020.
- (★) “Counting Embedded Spheres with the Same Persistence.” Invited presentation at SIAM conference: Mathematics of Data Science. June 2, 2020.
- “Refining Persistence.” Invited lecture at the Summer Conference on Topology and its Applications (SUMTOPO 2019) in Johannesburg, South Africa. July 1–4, 2019.
- ( $\mathcal{Q}$ ) “Refining Persistence I and II.” Two invited plenary lectures for the Workshop on Applied Topology at Kyoto University. January 7 and 10, 2019.
- “The Many Forms of Merge Trees” at AbelSymposium 2018 in Geiranger, Norway. June 4, 2018.
- “The Fiber of the Persistence Map and Other Problems from TDA.” *Invited Junior Faculty Speaker* at the Graduate Student Topology and Geometry Conference (GSTGC), April 7, 2018.
- “The Role of (Co)Sheaves in TDA” at AMS Special Session on Sheaves in TDA at the 2017 Joint Math Meetings (JMM) in Atlanta. January 4, 2017.
- “Counting Realizations of a Barcode” at Union College. December 3, 2016.
- “Realization Problems in Persistence” at Applied Topology: Methods, Computations, and Science (ATMCS7). July 25–29, 2016.
- “Realization Problems in Persistence” at Topology, Geometry, and Data Analysis @ OSU. May 16–20, 2016.
- “Recent results on constructible Reeb spaces and the interleaving distance.” at the AMS Special Session on Applied and Computational Topology of the Joint Mathematics Meeting (JMM) in Seattle, January 9, 2016.
- “Clustering with Cosheaves” at the Applied Topology and High Dimensional Data Analysis (ATHDDA) in Victoria, August 12–21, 2015.
- “Persistent Homology via Cellular Cosheaves” at the mini-symposium on Applied and Computational Topology at the SIAM conference on Applied Algebraic Geometry in Fort Collins, CO, August 1–4, 2013.
- “Persistent Homology via Cellular Cosheaves.” Applied and Computational Algebraic Topology at the University of Bremen, Germany, July 15–19, 2013.

- “Persistent Homology via Cellular Cosheaves” Symposium on Computational Geometry in Rio de Janeiro, Brasil, June 17-20, 2013.
- “Cosheaves, Persistence, and Sensor Networks.” AMS Sectional Meeting: Akron, Ohio. Special Session on Applied Topology, October 21, 2012.
- “Cosheaves and Dualities in Generalized Sensor Networks.” Special Session on Applied and Computational Topology at MAA MathFest, Aug 2-4 2012.
- “Cosheaves and Dualities in Generalized Sensor Networks.” Stanford Symposium - July 23-27, 2012. Algebraic Topology: Applications and New Directions. A conference to celebrate the birthdays of Gunnar Carlsson, Ralph Cohen, Ib Madsen. July 27th, 2012.
- “Cosheaves and Dualities in Generalized Sensor Networks,” Applied and Computational Topology: ATMCS 5 International Centre for Mathematical Sciences (ICMS), 15 S. College St. Edinburgh, Scotland, July 6th, 2012.
- “Obstruction-Theoretic Sensing.” Indiana University Graduate Student Topology Conference, March 31, 2012.
- “Obstruction-Theoretic Sensing.” AMS Special Session on Computational and Applied Topology, Joint Meetings. Jan 5, 2012.
- poster presentations (★) “Decorated Merge Trees for Persistent Topology.” Institute for Mathematical Statistics and Innovation (IMSI) hosted at the University of Chicago, Workshop on Topological Data Analysis. April 27, 2021.
- selected workshop talks “Algebraic and Geometric Models for Space Networking.” Presentation at the NASA-wide DTN Face-to-Face meeting. Feb 10, 2023.
- “Algebraic and Geometric Models for Space Networking.” Invited Talk for the DTN Working Group at NASA. Held virtually at NASA Goddard. Nov 17, 2022.
- “Decorated Merge Trees for Persistent Topology.” Invited Talk at the Computational Persistence 2022 Workshop, virtually at Purdue University. Nov 2, 2022.
- “Refining Persistence” at Topological Data Analysis with Applications, University of Western Ontario, London, Ontario, Canada. May 2–5, 2019.
- “The Utility of Sheaves in Persistence” at BIRS-CMO Special Workshop on Multiparameter Persistent Homology. August 8, 2018.
- “Bi-stable invariants of Time Series” at the Wright Brothers Institute in Dayton, Ohio. July 26, 2018.
- “Introduction to (Co)Sheaves and Open Problems” at Bridging Statistics and Sheaves (SW5.21-25.18) at the Institute for Math and its Applications (IMA) in Minneapolis, MN. May 21, 2018.
- “The Fiber of the Persistence Map” BIRS Workshop 17w5108 Topological Data Analysis: Developing Abstract Foundations, BIRS, July 30, 2017.
- “Stratified Covering Maps and Interleavings” as part of the Applied Algebraic Topology Research Network on October 27, 2015.

- “Multi-dimensional persistence and vineyards” at the Multi-Dimensional Persistent working group on June 10th, 2015
- “Applications of Sheaf Theory to TDA Parts I and II” as part of a Workshop on Topological Data Analysis at the Department of Mathematics, Kyoto University, on June 6-7, 2014.
- “Parameterized Filtrations and Persistence” as part of the AIM Workshop on Generalized Persistence and Applications, September 10th, 2014
- “Applied Sheaf Theory I,II, and III” Three invited talks at the Workshop on Applied Topology at RIMS, Kyoto University, June 10-14, 2013.
- “Linear Algebra over Cell Complexes: Applications to Data, Coding and Sensor Networks.” IAS-Penn-Rutgers joint workshop in Identifying Order in Complex Systems, given at Rutgers joint with the BioMaPS institute, February 6, 2013.

selected  
seminars

*Texas State University in San Marcos*

- “Algebraic and Geometric Models for Space Networking” April 6, 2023.
- “Exemplars of Sheaf Theory in TDA” (Topology Seminar) April 7, 2023.

*Topos Institute Invited Colloquium*

- “Algebraic and Geometric Models for Space Networking” March 2, 2023.

*Persistence, Sheaves, and Homotopy Theory Online Seminar*

- “Algebraic and Geometric Models for Space Networking” January 10, 2023.

*Applied Algebraic Topology Research Network (AATRN)*

- “Exemplars of Sheaf Theory in TDA.” May 18, 2022.

<https://youtu.be/XX1ZoeJHqrQ>

*Topology and Dynamics Seminar at UF*

- “Metrics and Stratifications in Modern Applied Topology.” January 18, 2022.

*Oxford TDA Seminar*

- “Exemplars of Sheaf Theory in TDA.” October 15, 2021.

*Valley Geometry Seminar at UMASS Amherst*

- “When Computer Science Meets Sheaf Theory.” December 7, 2018.

*Departmental Colloquium at UAlbany*

- “How Many Directions Determine a Shape?” Oct. 12, 2018.

*DAT Seminar at CUNY Graduate Center*

- “The Fiber of the Persistence Map.” December 1, 2017.

*Algebra and Topology Seminar at UAlbany*

“Foundations of TDA I, II, III.” November 2, 9, 16, 2017.

*Brown Applied Topology and Geometry Seminar*

“The Fiber of the Persistence Map.” September 21, 2017.

*The MacPherson Seminar*

“Notes from the Field.” June 23, 2016.

“(Co)Sheaves over Posets: A Tool for Applications.” Oct. 8, 24, Nov. 5, 2012.

“Derived Equivalence b/w Cellular Sheaves and Cosheaves.” Apr. 19, 2012

“Sensor Networks and Constructible (Co)Sheaves.” December 15, 2011.

“Cellular Sheaves, Cohomology and Applications.” December 5, 2011.

*Mini-Course at OSU*

“Sheaves as a Foundation for Persistence” on March 9, 2015.

“Understanding the interleaving distance between sheaves” on March 10, 2015.

“Open problems and higher categories for persistence” on March 13, 2015.

referee  
for

*Journal of Topology and Analysis (JTA)*

*Journal of Pure and Applied Algebra (JPAA)*

*Symposium on Computational Geometry (SoCG)*

*MIT Press*

*Algebraic and Geometric Topology (AG&T)*

*Notices of the AMS*

*Journal of Applied and Computational Topology (JACT)*

*SIAM Journal on Applied Algebra and Geometry (SIAGA)*

*Homotopy, Homology, and Applications (HHA)*

*Oxford Journal of Complex Networks*

*SIAM Journal of Undergraduate Research Online (SIURO)*

*Discrete & Computational Geometry (DCG)*

*Symposium on Discrete Algorithms (SODA)*

professional  
service

Creator and Co-organizer of the *Applied Topology in Albany (ATiA) Seminar*.

International online seminar—<https://atia-seminar.github.io/>—Fall 2020-Present.

Mental Health Panel for *Summer Geometry Initiative (SGI) 2022*. August 10, 2022.

Co-organizer of Discrete Math Day at Albany. April 25-26, 2020.

Co-organizer of the Union College Math Conference. September 13-15, 2019.

Co-organizer of the AMS Special Session at the Joint Math Meeting on

*Topological Data Analysis: Theory and Applications*. January 19th, 2019.

Co-organizer of the MAA Panel at the Joint Math Meeting on

*Mental Health in the Mathematics Profession*. January 16th, 2019.

Co-organizer of Bridging Statistics and Sheaves (SW5.21-25.18) at the Institute for Math and its Applications (IMA) in Minneapolis, MN. May 21-25, 2018.

Co-organizer of the *Mini-Symposium on Applied and Computational Topology* as part of SIAM Algebraic Geometry 2017.

Co-organizer of the *5th Mini-Symposium on Computational Topology* as part of the Symposium on Computational Geometry (SoCG), June 14-18, 2016.

Organizer of *John Harer's Group Seminar*, Fall 2014.

Organizer of *The MacPherson Seminar* at the IAS, Fall 2012–Spring 2014.

**Ordered by accumulated time and effort:**

university  
service

Search Committee for the Founding Director of the Institute for AI.

March 2023–August 2023

Program Committee for UAlbany AI Symposium. Nov 21, 2022.

college  
service

Daniel and Wendy J.L. Keyser Teaching Excellence Award Committee:

CAS teaching award committee for graduate student instructors. Fall 2021

departmental  
service

Search Committee

Vice-chair and member of 4 search committees related to data science/AI. Responsible for coordinating with ODI for the rubrics for each search. August 2022–March 2024

Creator and Co-organizer of the *Applied Topology in Albany (ATiA)* Seminar.

Run as a departmental seminar, Fall 2019–Present.

Actuarial Math Major Advisor and Undergraduate Student Outreach.

Advising 5-7 students and help w/ open house events. Fall 2017–Present.

Graduate Admissions Committee

For admission to the PhD program in mathematics. December 2020–April 2022.

Undergraduate Education Committee

Working to develop a data science BS degree. Fall 2021–Present.

Diversity Committee

To improve diversity in the Math Dept. Spring 2022–Present.

Webmaster and Facebook Admin for the UAlbany Math and Statistics webpage.

I assist in updating the math department website for colloquia, events and other design changes. I also created <https://www.facebook.com/ualbanymath>. Fall 2018–Present.

teaching  
experience

*Modern Computing for Mathematicians (AMAT 502)* at SUNY Albany.

2xFa2019, Sp2020, 2xFa2020, Sp2021, 2xFa2021, Sp2022, 2xFa2022, 2xFa2023,  
2xFa2024.

*Probability for Statistics (AMAT 362)* at SUNY Albany.

Sp2019, Sp2020, Sp2021, Sp2022.

*Topics Course on Sheaf Theory (AMAT 899)* at SUNY Albany. Fa2018.

*Topological Data Analysis III (AMAT 585)* at SUNY Albany. Fa2018.

*Discrete Probability (AMAT 367)* at SUNY Albany. Sp2018, Sp2019.

*Topological Data Analysis II (AMAT 584)* at SUNY Albany. Sp2018.

*Topological Data Analysis I (AMAT 583)* at SUNY Albany. Fa2017.

*Linear Programming and Game Theory (Math 375)* at Duke University. Fa2015, Sp2017.

*Partial and Ordinary Differential Equations (Math 353)* at Duke University. Fa2014.

*Applied Algebraic Topology (ESE 680)* at the University of Pennsylvania. Fa2013.

community  
outreach

*Albany High School Power Lunch Program:* In collaboration with Frank del Signore, Amanda Powers, and Richard Shea—all at Albany High School—I have kickstarted a new lunch-and-learn series at Albany High School to recruit students for a potential Summer Student Research Program—*SEEDS4MATH* student educational experiences in data science for math inspiration. This involved recruiting experts in the area in data visualization (Curran Kelleher) and program managers at NASA (Alan Hylton) to come and give talks to students during their lunch period.

*MIT High School Studies Program:* An outreach program where MIT undergraduates and community members offer classes to local area high school students coming from diverse racial, ethnic and socio-economic backgrounds. I developed a reading and lecture course loosely organized around the mathematical, scientific and philosophical themes of Douglas Hofstadter's Pulitzer-prize-winning book *Gödel, Escher, Bach: an Eternal Golden Braid*. The course was selected by MIT OpenCourseWare to be filmed and freely distributed. My lectures have received over 150,000 views on YouTube. Spring 2005–Fall 2007.