

Joshua Mirth

Curriculum Vitae

✉ mirth@math.colostate.edu

📄 www.math.colostate.edu/~mirth/

Education

- 2015–present **Doctorate**, (*In progress*), Colorado State University, *Mathematics*.
Advisor: Henry Adams
- 2015–2017 **Master of Science**, Colorado State University, *Mathematics*.
Thesis – *Metric Thickenings of Euclidean Submanifolds*. Advisor: Henry Adams.
- 2011–2015 **Bachelor of Science**, *Summa Cum Laude*, with *Departmental Honors*, Hillsdale College, *Mathematics*.
Senior Thesis – *Functional Analysis and the Dirichlet Problem*, minor in physics. Advisor: David Gaebler.

Publications

- 2019 *On the nonlinear statistics of optical flow* with Henry Adams, Johnathan Bush, Brittany Carr, and Lara Kassab. *Proceedings of Computational Topology in Image Context*, LNCS volume 11382 (2019), 151–165. Available at [arXiv:1812.00875](https://arxiv.org/abs/1812.00875).
- 2019 *Metric thickenings of Euclidean submanifolds* with Henry Adams. *Topology and its Applications*, 254:69–84, 2019. Available at [arXiv:1709.02492](https://arxiv.org/abs/1709.02492).
- Submitted *A fractal dimension for measures via persistent homology* with Henry Adams, Manuchehr Aminian, Elin Farnell, Michael Kirby, Rachel Neville, Chris Peterson, Patrick Shipman, and Clayton Shonkwiler. Available at [arXiv:1808.01079](https://arxiv.org/abs/1808.01079).

Talks and Presentations

Research Talks

- 2019 Jul. *Morse Theory for Wasserstein Spaces*, Young Topologists Meeting, École Polytechnique Fédérale de Lausanne.
- 2019 May *Morse Theory for Wasserstein Spaces*, Geometric Data Analysis Conference, University of Chicago (poster presentation).
- 2018 Nov. *On the nonlinear statistics of optical flow*, SPAMlab, Colorado State University.
- 2018 Apr. *Metric Thickenings of Euclidean Submanifolds*, Graduate Student Topology and Geometry Conference, University of Chicago.
- 2017 Sep. *Metric Thickenings of Euclidean Submanifolds*, SIAM Central States Sectional Meeting, Applied Algebraic Topology session, Colorado State University.

- 2017 Jul. *Metric Thickenings of Euclidean Submanifolds*, TDA: Theory and Applications, workshop at Macalaster College (poster presentation).
- 2015 Apr. *Functional Analysis and the Dirichlet Problem*, Michigan Undergraduate Mathematics Conference, Hope College.
- 2013 Jul. *Simulating Post-Reconnection Coronal Flux Tubes* American Astronomical Society Solar Physics Division Meeting (Poster with Dana Longcope).

Expository Talks

- 2019 Sep. *Optimal Transport and PDEs*, SPAM Lab, CSU.
- 2019 May *The Optimal Transport Problem*, SPAM Lab, CSU.
- 2018 Oct. *Simplicial Complexes, Simplicial Sets, and Realizations*, CSU Category Theory Seminar.
- 2018 Oct. *Introduction to Derived Categories*, CSU Category Theory Seminar.
- 2018 Sep. *Smooth and Discrete Morse Theory*, CSU Topology Seminar.
- 2018 Sep. *Limits and Colimits*, CSU Category Theory Seminar.
- 2018 Jul. *The Yoneda Lemma*, CSU Category Theory Seminar.
- 2018 Jun. *Simplicial Sets*, CSU Category Theory Seminar.
- 2017 Dec. *Morse Theory: An Introduction*, CSU Greenslopes seminar.

Conferences and Workshops

- 2019 Aug. Workshop on Applied Mathematical Modeling with Topological Techniques, ICERM
- 2019 Jul. Young Topologists Meeting, École Polytechnique Fédérale de Lausanne
- 2019 May Geometric Data Analysis Conference, University of Chicago
- 2018 Aug. Tutorial on Multiparameter Persistence, Computation, and Applications, The Institute for Mathematics and its Applications
- 2018 May TGDA@OSU TRIPODS Center Summer School and Workshop, Mathematical Biosciences Institute at the Ohio State University
- 2018 Apr. Graduate Student Topology and Geometry Conference 2018, University of Illinois at Chicago
- 2017 Jun. Topological Data Analysis: Theory and Applications, Macalaster College
- 2017 Apr. Graduate Student Topology and Geometry Conference 2017, Michigan State University

Teaching

2015–present **Graduate Teaching Assistant**, *Colorado State University*, Mathematics Department.

Instructor of record:

- Math 340 – Introduction to Ordinary Differential Equations, Spring 2018, Fall 2018, Spring 2019, Fall 2019
- Math 261 – Calculus for Physical Scientists III, Fall 2017
- Math 160 – Calculus for Physical Scientists I, Fall 2016, Spring 2017
- Math 141 – Calculus in Management Sciences (online), Summer 2019

Teaching assistant:

- Math 161 – Calculus for Physical Scientists II, Fall 2015, Spring 2016

Outreach:

- Co-taught (with Henry Adams) a two week course on Applied and Computational Topology at the Universidad de Costa Rica, Summer 2017.

Service and Administrative

Peer-Review

2019 Symposium on Computational Geometry

Seminar and Conference Organization

2018–present **Co-organizer**, *Category Theory Seminar*, Colorado State University.

2018 **Co-organizer**, *Greenslopes Seminar*, Colorado State University.

Miscellaneous

2019–2020 **President**, AMS, Colorado State University Graduate Student Chapter.

2019–2020 **Webmaster**, SIAM, Colorado State University Student Chapter.

2017–2018 **Secretary**, SIAM, Colorado State University Student Chapter.

2016–2017 **Treasurer**, SIAM, Colorado State University Student Chapter.

2014–2015 **Vice-President**, *Kappa Mu Epsilon*, Hillsdale College Chapter.

2013–2014 **Treasurer**, *Kappa Mu Epsilon*, Hillsdale College Chapter.

2013–2015 **Putnam Team**, Hillsdale College.

Other Experience

Computational

2016–2017 **Programmer**, *Colorado State University*, Environmental Health Department.
Developed tools for analysis of motion tracker data in MATLAB.

2013 **REU**, *Montana State University*, Solar Physics.
Developed and tested numerical models of magnetic reconnection in the solar corona.

Awards

- Outstanding Graduate Teaching Assistant - Colorado State University Mathematics Department (2018–2019)

- Taylor Award - Highest GPA among Hillsdale College Mathematics graduates (2015)
- Kimball Medal - top male athlete at Hillsdale College (2015).
- Hillsdale College Dean's List (8 semesters)
- National Merit Scholar (2011)
- NCAA Division II All-American – Cross Country: 2012 and 2014, Indoor Track: 2015