

Ann Sizemore Blevins

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<https://aesizemore.com>

October 20, 2020

Education

- 2019 Ph.D. University of Pennsylvania, Bioengineering
Advisor: Dr. Danielle Bassett
Thesis: “Extending topological data analysis in biological systems”
- 2015 M.S.E University of Pennsylvania, Bioengineering
Advisors: Dr. Danielle Bassett, Dr. Chad Giusti
Thesis: “Cliques and cycles: a complementary pair of homological features detects structures in weighted networks”
- 2014 B.S. Boston College, Biology
Advisor: Dr. Evan Kantrowitz
Thesis: “Pi-Pi stacking interactions in aspartate transcarbamoylase”
- B.A. Boston College, Mathematics

Employment

- Current University of Pennsylvania, Bioengineering Department
Postdoctoral Researcher
Advisor: Dr. Danielle Bassett
- 2015 – 2016 Broad Institute of MIT and Harvard, Cancer Program
Associate Computational Biologist
Advisor: Dr. William Hahn

Teaching and Mentoring Experience

- 2020 Co-instructor of Biological Data Science (ENM 375) for undergraduates. Spring.

Student feedback:

- “I really enjoyed being taught by Dr. Blevins, I would take another class just to be taught by her again!”

- “In-class exercises and going through them together to start was very helpful. They helped implement the code for the two projects and complete the homework as well.”

- “Dr. Sizemore was extremely helpful and passionate about helping her students. If ever I had questions, she was so open and willing to meet with me one on one which was so helpful. My only complaint is that I am not a huge fan of statistics, hence the lower scores in some areas of the above survey.”

- 2019 Center for Teaching and Learning Teaching Certificate awarded.
- 2018 TA for undergraduate class Curiosity: Ancient and Modern Thinking About Thinking
Received TA rating of 4.0 out of 4.0.
- 2018 Applied Topology in Neuroscience Seminar. Spring.
- 2015 TA for Sophomore-level Biostatistics class.

Guest Lectures

- 2020 Oct. Network Neuroscience
“Topological data analysis.”
- 2019 Oct. Honors Linear Algebra (University of Delaware)
“Topology in Data”
- 2019 Apr. Network Neuroscience
“Applied Topology for Network Neuroscience.”
- 2018 Nov. Curiosity: Ancient and Modern Thinking About Thinking
“Knowledge Gaps.”
- 2017 Sept. Network Neuroscience
“Comparing Networks.”
- 2017 Oct. Differential Equations
“Homogeneous Equations with Constant Coefficients.”
- 2017 Oct. Network Neuroscience
“Persistent Homology.”

Students Advised

- 2019–2020 Research assistant Alec Helm. Topic: Reorderability in *C. elegans* neurodevelopment.
- 2018 Undergraduate Melanie Hilman. Topic: Collecting concept maps in the classroom.
- 2018 Summer undergraduate Nico Christianson. Topic: Identifying knowledge gaps in textbooks.
- 2017 Summer undergraduate Martin Rubin. Topic: Language of mathematics.

2017– Semester undergraduate Pooja Shah. Topic: Graph learning.
2018

Articles

Google scholar: <https://scholar.google.com/citations?user=nIbe4HkAAAAJ&hl=en>

Ann Sizemore, Chad Giusti, and Danielle S. Bassett. "Classification of weighted networks through mesoscale homological features." *Journal of Complex Networks* 5.2 (2016): 245-273.

Ann E. Sizemore, Chad Giusti, Ari Kahn, Richard Betzel, Danielle S. Bassett "Cliques and cavities in the human structural connectome." *Journal of computational neuroscience* 44.1 (2018): 115-145.

Ann E. Sizemore and Danielle S. Bassett "Dynamic Graph Metrics: Tutorial, Toolbox, and Tale." *NeuroImage* 180 (2018): 417-427.

Ankit N. Khambhati, **Ann E. Sizemore**, Richard F. Betzel, Danielle S. Bassett "Modelling and Interpreting Network Dynamics." *NeuroImage* 180 (2018): 337-349.

Robin M. Meyers, Jordan G. Bryan, James M. McFarland, Barbara A. Weir, **Ann E. Sizemore**, Han Xu, Neekesh V. Dharia, Phillip G. Montgomery, Glenn S. Cowley, Sasha Pantel, Amy Goodale, Yenarae Lee, Levi D. Ali, Guozhi, Jiang, Rakela Lubonja, William F. Harrington, Matthew Strickland, Ting Wu, Derek C. Hawes, Victor A. Zhivich, Meghan R. Wyatt, Zohra Kalani, Jaime, J. Chang, Michael Okamoto, Todd R. Golub, Jesse S. Boehm, Francisca Vazquez, David E. Root, William C. Hahn, Aviad Tsherniak "Computational correction of copy-number effect improves specificity of CRISPR-Cas9 essentiality screens in cancer cells." *Nature genetics* 49.12 (2017): 1779.

Ann E. Sizemore, Elisabeth A. Karuza, Chad Giusti, Danielle S. Bassett "Knowledge gaps in the early growth of semantic networks." *Nature human behaviour* 2.9 (2018): 682.

Sydney M. Shaffer, Benjamin L. Emert, Raúl A. Reyes Hueros, Christopher Cote, Guillaume Harmange, Dylan L. Schaff, **Ann E. Sizemore**, Rohit Gupte, Eduardo Torre, Abhyudai Singh, Danielle S. Bassett, Arjun Raj "Memory Sequencing Reveals Heritable Single-Cell Gene Expression Programs Associated with Distinct Cellular Behaviors." *Cell* 182.4 (2020): 947-959.

Joshua Pan, Robin M Meyers, Brittany C Michel, Nazar Mashtalir, **Ann E. Sizemore**, Jonathan N Wells, Seth H Cassel, Francisca Vazquez, Barbara A Weir, William C Hahn, Joseph A Marsh, Aviad Tsherniak, Cigall Kadoch "Interrogation of Mammalian Protein Complex Structure, Function, and Membership Using Genome-Scale Fitness Screens." *Cell systems* 6.5 (2018): 555-568.

Ann E. Sizemore, Jennifer Phillips-Cremins, Robert Ghrist, Danielle S Bassett "The importance of the whole: topological data analysis for the network neuroscientist." *Network Neuroscience* (2018): 1-18

Tanaz Sharifnia, Mathias Wawer, Ting Chen, Qing-Yuan Huang, Barbara A. Weir, **Ann Sizemore**, Matthew A. Lawlor, Amy Goodale, Glenn S. Cowley, Francisca Vazquez, Christopher J. Ott, Joshua M. Francis, Slim Sassi, Patricia Cogswell, Hadley E. Sheppard, Tinghu Zhang, Nathanael S. Gray, Paul A. Clarke, Julian Blagg, Paul Workman, Josh Sommer, Francis Hornicek, David E. Root, William C. Hahn, James E. Bradner, Kwok K. Wong, Paul A. Clemons, Charles Y. Lin, Joanne D. Kotz, and Stuart L. Schreiber “Small-molecule targeting of brachyury transcription factor addiction in chordoma.” *Nature medicine* 25.2 (2019): 292-300.

Ann Sizemore Blevins and Danielle S. Bassett “On the reorderability of node-filtered order complexes.” *Physical Review E* 101.5 (2020): 052311.

Maxwell A. Bertolero, **Ann Sizemore Blevins**, Graham L. Baum, Raquel E. Gur, David R. Roalf, Theodore D. Satterthwaite, Danielle S. Bassett “The network architecture of the human brain is modularly encoded in the genome.” Submitted.

David M. Lydon-Staley, Dale Zhou, **Ann Sizemore Blevins**, Perry Zurn, Danielle S. Bassett “Hunters, busybodies, and the knowledge network building associated with deprivation curiosity.” Accepted at *Nature Human Behavior*.

Nicolas H. Christianson, **Ann Sizemore Blevins**, Danielle S. Bassett, “Architecture and evolution of semantic networks in mathematics texts.” *Proceedings of the Royal Society A* 476.2239 (2020): 20190741.

Ann Sizemore Blevins and Danielle S. Bassett “Topology in Biology.” *Journal: Handbook of the Mathematics of the Arts and Sciences* (2020): 1-23.

Leo Torres and **Ann S. Blevins**, Danielle S. Bassett, Tina Eliassi-Rad “The why, how, and when of representations for complex systems. arXiv preprint arXiv:2006.02870 (2020).

David M. Lydon-Staley, Eli J. Cornblath, **Ann Sizemore Blevins**, Danielle S. Bassett “Modeling brain, symptom, and behavior in the winds of change.” *Neuropsychopharmacology* (2020): 1-13.

Ann Sizemore Blevins, Jason Kim, and Danielle S. Bassett, “Topology of noise added to weighted networks.” In preparation.

Presentations

Invited Talks and Seminars

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| 2020 | Jul. | Organization of Human Brain Mapping (virtual, Rome, Italy)
“Multilayer Networks.” |
| 2020 | May | SIAM Mathematics of Data Science (virtual, Ohio)
“Reorderability of growing graphs.” |

- 2020 Mar. New Geometric Methods in Neuroscience at the Fields Institute (Toronto, Canada)
“The loopy topology of the human connectome.”
- 2020 Mar. Whistler Workshop on Brain Function (Vancouver, Canada)
“Finding knowledge gaps in the early semantic network.”
- 2019 Aug. Junior Science Workshop on Advanced Neural Data Analysis (New York, NY)
“Uncovering the topology of the human connectome.”
- 2019 Jun. Kavli Summer Institute in Cognitive Neuroscience (Santa Barbara, CA)
“How can topology help us understand the brain?”
- 2019 May Society of Young Network Scientists, NetSci (Burlington, VT)
“Algebraic Topology in Network Science.”
- 2019 May Cognitive Science Satellite, NetSci (Burlington, VT)
“Finding knowledge gaps in the early growing semantic network.”
- 2019 Jan. Joint Mathematics Meeting (Baltimore, Maryland)
“Meaningful Voids: Applying Algebraic Topology to Network Neuroscience.”
- 2018 Dec. Computation and Theory Seminar (Janelia Research Campus)
“Cliques and Cavities in Neuroscience”
- 2018 Oct. Topology in Biology Symposium (University of Pennsylvania)
“Topology in Biological Systems.”
- 2018 Jun. Organization of Human Brain Mapping (Singapore)
“Introduction to applied algebraic topology for the analysis of networks.”
- 2017 Aug. Applied Algebraic Topology 2017 (Hokkaido University)
“Insights into connectome organization using computational topology.”
- 2017 Aug. SIAM Conference on Applied Algebraic Geometry (Georgia Tech. University)
“Connectome organization via persistent homology.”
- 2017 Apr. College of the Holy Cross Mathematics Seminar
“Cliques and cavities in neuroscience.”
- 2017 Feb. Brown University Applied Topology Seminar
“Cliques and cavities in neuroscience.”
- 2016 Dec. Union College Mathematics Conference
“Closures and cavities in the human connectome.”
- 2016 May Experimental Chaos in Complexity (Calgary, Canada)
“Exposing mesoscale connectivity patterns in the structural brain network.”

Public Talks

- 2016 Oct. Broad Institute of Harvard and MIT, Models, Inferences, and Algorithms Primer
“Topological Data Analysis: What is Persistent Homology?”

- 2016 Jun. University of Pennsylvania, Penn Network Visualization Program
“Shapes in the brain.”
- 2015 May American Association of University Women Girls Recognition Reception
“Pursuing Science.”
- 2014 May Boston College Biology Undergraduate Honors Thesis Presentations
“Pi-Pi Stacking interactions in aspartate transcarbamoylase.”

Posters

- 2019 May Network Science Society (NetSci)
“The why, how, and when of representations for complex systems.”
- 2016 Nov. Society for Neuroscience
“Functional role of topological cycles in the human structural connectome.”
- 2016 Jul. Society for Industrial and Applied Mathematics, Network Science Workshop
“Exposing mesoscale connectivity patterns in the structural brain network.”
- 2016 Mar. American Physical Society
“A novel perspective on neural network architecture: connections and dissections of homological features.”
- 2016 Feb. Computational and Systems Neuroscience
“A novel perspective on neural network architecture: connections and dissections of homological features.”
- 2014 Aug. Summer Scholars Poster Session at the Stowers Institute of Medical Research
“Studying the codiffusion of the secretory complex components through FCCS.”
- 2014 Aug. Boston College Chemistry Undergraduate Research Day.
“The importance of pi-pi stacking interactions in aspartate transcarbamoylase.”

Awards

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- 2016 Second place poster in the DBIO section of the American Physical Society March Meeting
 - 2014 Balkema Award for top Honors thesis in the Biology Department at Boston College
 - 2014 Phi Beta Kappa Membership
 - 2014 Pi Mu Epsilon Membership
 - 2012 Undergraduate Research Fellowship (through 2014).

Design and Scientific Illustration

Commissioned

- 2020 Lydon-Staley Laboratory Website <https://ahalabupenn.com/>
- 2020 Hopper, David et al., "Real-Time Charge Initialization of Diamond Nitrogen-Vacancy Centers for Enhanced Spin Readout" (Schematic)
- 2019 Zurn Laboratory Website <https://www.perryzurn.com>
- 2019 Huang, Tzu-Yung, et al. "A Monolithic Immersion Metalens for Imaging Solid-State Quantum Emitters." (Submitted Cover Art)
- 2019 Kim, Jason Z., et al. "Conformational Control of Mechanical Networks." (Submitted Cover Art)
- 2018 Complex Systems Laboratory Website <https://complexsystemsupenn.com/>
- 2018 Center for Complex Biological Systems Website: <https://www.ccbsupenn.com/>
- 2018 Bassett, Danielle S., Perry Zurn, and Joshua I. Gold. "Network models in neuroscience." <https://arxiv.org/abs/1807.11935> (Figures 1-3)
- 2018 Exarhos, Annemarie L., et al. "Magnetic-field-dependent quantum emission in hexagonal boron nitride at room temperature." (Submitted Cover Art)

Available Code

GitHub

<https://github.com/asizemore>

Network Generation and Analysis Toolbox

<https://sites.google.com/a/seas.upenn.edu/weighted-network-toolbox/home>

Dynamic Graph Metrics Toolbox

<https://github.com/asizemore/Dynamic-Graph-Metrics>

Filtered Network Model Reference

<http://filterednetworkmodelref.weebly.com/>

Multilayer Network Visualization

https://github.com/asizemore/multilayer_network_examples