Blair D. Sullivan

University of Utah
School of Computing
50 S. Central Campus Drive
Salt Lake City, UT 84112

@blairdsullivan
sullivan@cs.utah.edu
cs.utah.edu/~sullivan/

Education

Ph. D. in Mathematics. Princeton University, Princeton, New Jersey — June 2008
Thesis: *Extremal Problems in Digraphs.* Advisor: Paul D. Seymour.

M. A. in Mathematics. Princeton University, Princeton, New Jersey — January 2005

B. S. Computer Science,
B. S. Applied Mathematics. Georgia Institute of Technology, Atlanta, Georgia — May 2003
Summa Cum Laude, minor in Economics, GPA: 4.0

Professional Experience

Associate Professor, School of Computing
University of Utah, Salt Lake City, UT — July 2019 – present

Associate Professor, Department of Computer Science
Chancellor's Faculty Excellence Program in Data-Driven Science
Associate Faculty, Department of Mathematics
North Carolina State University, Raleigh, NC — August 2016 – June 2019

Joint Faculty, Computer Science & Mathematics Division
Oak Ridge National Laboratory (ORNL), Oak Ridge, TN — August 2013 – June 2019

Assistant Professor, Department of Computer Science
North Carolina State University, Raleigh, NC — August 2013 – July 2016

Research & Development Staff Member, Complex Systems Group
Oak Ridge National Laboratory, Oak Ridge, TN — July 2008 – August 2013

Graduate Research Assistant, Department of Mathematics
Princeton University, Princeton, NJ — September 2003 – June 2008

Visiting Researcher
Rényi Institute, Budapest, Hungary — October 2007 – April 2008

Graduate Student Intern, Theory Group
Microsoft Research, Redmond, WA — Summer 2007

U. S. Department of Homeland Security (DHS) Graduate Fellow Intern
Oak Ridge National Laboratory, Oak Ridge, TN — Summer 2004

Undergraduate Researcher, Departments of Mathematics and Computer Science
Georgia Institute of Technology, Atlanta, GA — June 2001 – August 2003

Honors

Moore Investigator in Data-Driven Discovery (2014); *1 of 14 selected from 1100.*

National Consortium for Data Science Faculty Fellow (2014)

Best LDRD SEED Project Poster, Oak Ridge National Laboratory (2012)

Supplemental Performance Award, Oak Ridge National Laboratory (2009, 2011)

DHS Dissertation Grant (2006 – 2007)

DHS Graduate Fellowship (2003 – 2006)

Phi Kappa Phi Scholarship Cup (2003); *Georgia Tech senior with most outstanding academic record*

Georgia Tech President's Scholar (1999 – 2003); Jo Baker Scholar (2003)

University System of Georgia Outstanding Scholar (2003)

Manuscripts

C. T. Brown, M. P. O'Brien*, F. Reidl, T. E. Reiter, B. D. Sullivan. Exploring neighborhoods in large metagenome assembly graphs reveals hidden sequence diversity. bioRxiv:10.1101/462788.

P. Drange , M. Dregi, D. Lokshtanov, B. D. Sullivan. On the threshold of intractability. ArXiv:1505.00612.

T. D. Goodrich*, E. Horton*, B. D. Sullivan. Practical graph bipartization with applications in near-term quantum computing. ArXiv:1805.01041.

E. Horton*, K. Kloster, B. D. Sullivan. Walk-classes, centrality collisions, and iso-centrality. In preparation (draft available upon request).

J. Kun, M. P. O'Brien*, M. Pilipczuk, B. D. Sullivan. Polynomial treedepth bounds in linear colorings. ArXiv:1802.09665v4.

M. P. O'Brien*, B. D. Sullivan. An experimental evaluation of a bounded expansion algorithmic pipeline. ArXiv:1712.06690.

Peer-Reviewed Publications

B. Lavallee*, H. Russell†, B. D. Sullivan, A. van der Poel*. Approximating Vertex Cover using Structural Rounding. To appear at *Algorithm Engineering & Experiments (ALENEX) 2020.* ArXiv:1909.04611.

E. D. Demaine, T. D. Goodrich*, K. Kloster, B. Lavallee*, Q. Liu, B. D. Sullivan, A. Vakilian, A. van der Poel*. Structural rounding: approximation algorithms for graphs near an algorithmically tractable class. *Proceedings of the 27th Annual European Symposium on Algorithms (ESA 2019)*, LIPIcs 144 pp 37:1–37:15, 2019. ArXiv:1806.02771.

E. D. Demaine, F. Reidl, P. Rossmanith, F. Sanchez Villaamil, S. Sikdar, B. D. Sullivan. Structural sparsity of complex networks: random graph models and linear algorithms. *Journal of Computer & System Sciences* (JCSS) 105:199–241, 2019. ArXiv:1406.2587.

B. D. Sullivan, A. van der Poel*, T. Woodlief†. Faster Biclique Mining in Near-Bipartite Graphs. *Proceedings of Special Event on Analysis of Experimental Algorithms (SEA^2)*, LNCS volume forthcoming, 2019. ArXiv:1903.01538.

*graduate students, †undergraduate students (direct mentees at time work performed).

K. Kloster, B. D. Sullivan, A. van der Poel*. Mining maximal induced bicliques using odd cycle transversals. *Proceedings of SIAM Conference on Data Mining (SDM19)*, 2019. ArXiv:1810.11421.

E. Horton*, K. Kloster, B. D. Sullivan. Walk-regularity and subgraph centrality. *Linear Algebra and its Applications*, 2019. ArXiv:1804.05966.

E. F. Dumitrescu, A. L. Fisher†, T. D. Goodrich*, T. S. Humble, B. D. Sullivan, A. L. Wright†. Benchmarking treewidth as a practical component of tensor-network-based quantum simulation. *PLoS ONE*, 13(12):e0207827, 2018. ArXiv:1807.04599.

J. Kun, M. P. O'Brien*, B. D. Sullivan. Treedepth Bounds in Linear Colorings. *Proceedings of 44th International Workshop on Graph-Theoretic Concepts in Computer Science (WG)*, 2018. ArXiv:1802.09665v3.

K. Kloster, D. Král', B. D. Sullivan. Walk entropy and walk-regularity. *Linear Algebra and its Applications*, 546, 2018. 10.1016/j.laa.2018.02.009. ArXiv:1708.09700.

T. D. Goodrich*, T. S. Humble, B. D. Sullivan. Optimizing Adiabatic Quantum Program Compilation using a Graph-Theoretic Framework. *Quantum Information Processing*, 17:118, 2018. ArXiv:1704.01996.

K. Kloster, P. Kuinke, M. P. O'Brien*, F. Reidl, F. Sanchez Villaamil, B. D. Sullivan, A. van der Poel*. A practical algorithm for Flow Decomposition and transcript assembly. *Algorithm Engineering & Experiments (ALENEX) 2018.* ArXiv:1706.07851.

Irene Muzi, M. P. O'Brien*, F. Reidl, B. D. Sullivan. Being even slightly shallow makes life hard. *Mathematical Foundations of Computer Science (MFCS) 2017.* ArXiv:1705.06796.

M. Farrell†, T. Goodrich†, N. Lemons, F. Reidl, F. Sanchez Villaamil, B. D. Sullivan. Hyperbolicity, degeneracy and expansion of random intersection graphs. *Journal of Internet Mathematics,* 2017. DOI:10.24166/im.06.2017

R. Bridges, J. Collins, E. Ferragut, J. Laska, B. D. Sullivan. A multi-level anomaly detection algorithm for time-varying graph data with interactive visualization. *Social Network Analysis and Mining* 6:99, 2016.

A. J. Chin†, T. D. Goodrich*, M. P. O'Brien*, F. Reidl, B. D. Sullivan, and A. van der Poel*. Asymptotic Analysis of Equivalences and Core-Structures in Kronecker-Style Graph Models. *2016 IEEE 16th International Conference on Data Mining (ICDM)*, Barcelona, 2016, pp. 829-834.
[full paper acceptance rate=9.7%]

B. D. Sullivan, A. van der Poel*. A Fast Parameterized Algorithm for Co-Path Set. *11th International Symposium on Parameterized and Exact Computation (IPEC 2016)*, 2016. ArXiv:1603.04376

A. Adcock*, M. Mahoney, B. D. Sullivan. Tree decompositions and social graphs. *Journal of Internet Mathematics* 12(5):315–361, 2016. ArXiv:1411.1546

A. Adcock*, E. Demaine, M. Demaine, M.P. O'Brien*, F. Reidl, P. Rossmanith, F. Sánchez Villaamil, B. D. Sullivan. Zig-Zag Number Link is NP-complete. *Journal of Information Processing* 23(3):239–245, 2015. Special issue on Recreational Discrete Mathematics.

M. Farrell†, T. Goodrich*,†, N. Lemons, F. Reidl, F. Sanchez Villaamil, B. D. Sullivan. Hyperbolicity and expansion of random intersection graphs. *Proceedings of WAW15 (12th Workshop on Algorithms and Models for the Web Graph*, 2015. ArXiv:1409.8196

P. Drange , M. Dregi, D. Lokshtanov, B. D. Sullivan. On the threshold of intractibility. *Proceedings of the European Symposium on Algorithms (ESA)*, LNCS 9294:411–423, 2015. ArXiv:1505.00612.
[full paper acceptance rate=26%]

T. Humble, A. McCaskey, R. Bennink, J. Billings, E. D'Azevedo, B. D. Sullivan, C. Klymko*, H. Seddiqi. An integrated development framework for adiabatic quantum programming. *Computational Science & Discovery* 7 015006, 2014.

*graduate students, †undergraduate students (direct mentees at time work performed).

R. Bridges, J. Collins, E. Ferragut, J. Laska, B. D. Sullivan. Multi-level anomaly detection on time-varying graph data. *Proceedings of the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*, 2015. ArXiv:1410.4355.
[short paper acceptance rate=18%]

M. P. O'Brien*, B. D. Sullivan. Locally estimating core numbers. *Proceedings of the 2014 IEEE International Conference on Data Mining (ICDM)*: 460–469, 2014. Shenzhen, China.
[full paper acceptance rate=9.7%]

C. Klymko*, B. D. Sullivan, and T. Humble. Adiabatic quantum programming: minor embedding with hard faults. *Quantum Information Processing* 13(3):709–729, 2014.

A. Adcock*, B. D. Sullivan, and M. Mahoney. Tree-like structure in social and information networks. *Proceedings of the 2013 IEEE International Conference on Data Mining (ICDM'13)*: 1–10, 2013.
[full paper acceptance rate=11.62%]

A. Adcock*, B. D. Sullivan, O. Hernandez, and M. Mahoney. Evaluating OpenMP tasking at scale for the computation of graph hyperbolicity. *Proceedings of the International Workshop on OpenMP (IWOMP)*, September 2013. Canberra, Australia.

B. D. Sullivan, D. Weerapurage, and C. Groer. Parallel algorithms for graph optimization using tree decompositions. *Proceedings of the International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, May 2013. Cambridge, Massachusetts.

B. D. Sullivan. On a conjecture of Andrica and Tomescu. *Journal of Integer Sequences* 16(3):1, 2013.

C. Groer, B. D. Sullivan, and S. Poole. A mathematical analysis of the R-MAT random graph generator. *Networks* 58(3):159–170, 2011.

P. Seymour and B. D. Sullivan. Counting paths in digraphs. *European Journal of Combinatorics* 31(3):961–975, 2010.

M. Chudnovsky, P. Seymour, and B. D. Sullivan. Cycles in dense digraphs. *Combinatorica* 28(1):1–18, 2008.

M. Nathanson and B. D. Sullivan. Heights in finite projective space, and a problem on directed graphs. *Integers* 8(A13), 2008.

V. Blair Dowling [Sullivan] and W. A. Dowling. Intellectual property and academia. *Journal of Business and Economics Research* 4(1):103–109, 2003.

Technical Reports

J. Lothian, S. Powers, B. D. Sullivan, M. Baker, J. Schrock, and S. Poole. Graph generator survey. Technical Report ORNL/TM-2013/339. Oak Ridge National Laboratory, Oak Ridge, TN, 2013.

C. Groer, B. D. Sullivan, and D. Weerapurage. INDDGO: Integrated Network Decompositions & Dynamic programming for Graph Optimization. Technical Report ORNL/TM-2012/176. Oak Ridge National Laboratory, Oak Ridge, TN, 2013.

B. D. Sullivan, C. Groer, and S. Poole. Computational analysis of two graph compression algorithms. Technical Report ORNL/TM-2009/193. Oak Ridge National Laboratory, Oak Ridge, TN, 2009.

B. D. Sullivan. A summary of results and problems related to the Caccetta-Haggkvist conjecture. Technical Report 2006-13. American Institute of Mathematics, Palo Alto, CA, 2006.

---

*graduate students, †undergraduate students (direct mentees at time work performed).

Refereed Extended Abstracts

1-2 page conference submissions accepted for oral presentation; full research results published independently.

Toboggan. P. Kuinke, M. P. O'Brien*, F. Reidl, F. Sanchez Villaamil, B. D. Sullivan, A. van der Poel*. *Intelligent Systems for Molecular Biology (ISMB/ECCB)*, Prague, Czech Republic, July 2017.

Extracting neighborhood structure from very large DNA graphs. C. T. Brown, D. Moritz, M. P. O'Brien*, F. Reidl, B. D. Sullivan. *SIAM NS17*, Pittsburgh, PA, July 2017.

A Fast Parameterized Algorithm for Co-Path Set. B. D. Sullivan, A. van der Poel*. *SIAM NS16*. Boston, MA, July 2016.

Structural Sparseness and Complex Networks. E. Demaine, M. P. O'Brien*, F. Reidl, P. Rossmanith, F. Sanchez Villaamil, S. Sikdar, B. D. Sullivan. *SIAM NS16*. Boston, MA, July 2016.

Optimizing Adiabatic Quantum Program Compilation using a Graph-Theoretic Framework. T. D. Goodrich*, T. Humble, B. D. Sullivan. *SIAM NS16*. Boston, MA, July 2016.

Characterizing, exploiting and predicting algorithmic structure in complex networks. E. Demaine, F. Reidl, P. Rossmanith, F. Sanchez Villaamil, S. Sikdar, B. D. Sullivan. *NetSci 2015*. Zaragoza, Spain, June 2015.

Hyperbolicity, degeneracy & expansion of random intersection graphs. M. Farrell†, T. Goodrich†, N. Lemons, F. Reidl, F. Sanchez Villaamil, B. D. Sullivan. *SIAM NS15*. Snowbird, Utah, May 2015.

Software

Unless otherwise noted, all packages are hosted at `http://github.com/theoryinpractice`.

Structural-Rounding

With B. Lavallee*, A. van der Poel*.
Implementation of structural rounding framework for approximating Vertex Cover on near-bipartite graphs.

SpaceGraphCats

With C. Titus Brown, D. Moritz, M. P. O'Brien*, F. Reidl.
Package for efficiently computing a hierarchy of r-dominating graphs that summarize the neighborhood structure of a sparse graph at multiple resolutions, implemented in Python. Includes functionality for fast extraction of the neighborhood around a set of query vertices. A target use case for spacegraphcats is to organize de Bruijn graphs of large metagenomic sequence data and support queries to enhance binning and detect strain variants. Project hosted at: `https://github.com/spacegraphcats/spacegraphcats`.

MI-Bicliques

With K. Kloster, E. Horton*, A. van der Poel*, T. Woodlief†
C++ implementations of algorithms for enumerating maximal bicliques, including `OCT-MIB/OCT-MIB-II` and `OCT-MICA` (for induced and non-induced bicliques, respectively) in near-bipartite instances and `LexMIB` and `Enum-MIB`, variants of the algorithm for general graphs in Dias et al. 2005.

Practical OCT

With T. D. Goodrich*, E. Horton*.
Suite of pre-processing routines, heuristics, solvers, and harnesses used to compare algorithms for Odd Cycle Traversal (graph bipartization) based runtime or solution quality.

ConSequences

With A. L. Fisher†, T. D. Goodrich*, A. Wright†.
Framework providing a common interface for all existing algorithms for computing contraction sequences for tensor networks. Includes container-based wrappers for treewidth-based and domain-specific solvers and Python-based utilities for data conversions, command-line usage, and batch experiments.

*graduate students, †undergraduate students (direct mentees at time work performed).

TOBOGGAN
With K. Kloster, P. Kuinke, M. P. O'Brien*, F. Reidl, F. Sanchez Villaamil, A. van der Poel*.
Implementation of an exact FPT algorithm for decomposing a flow on a directed acyclic graph into a minimal number of paths, a problem that commonly occurs in transcript and metagenomic assembly.

AQC-VIRTUAL-EMBEDDING
With T. D. Goodrich*.
Framework for structured graph minor embeddings of optimization problems into quantum annealing hardware. Supports several embedding algorithms and reduction routines, including an approach using bipartite virtual hardware and odd cycle transversals to improve compilation into the D-Wave Chimera architecture.

SPIDERDONUTS
With K. Kloster, E. Horton†.
Python code for exploring walk-regularity in graphs and its signature in functions of the adjacency matrix.

BEAVR: Bounded Expansion Algorithm Visualizer
With Y. Ho†, C. Hobbs†, B. Mork†, F. Reidl, N. Rodrigues†.
Python tool offering interactive visualization of the algorithmic pipeline for counting subgraph isomorphisms in graph classes of bounded expansion, as implemented in CONCUSS. BEAVr was primarily developed by a NC State CSC Senior Design team.

CONCUSS: Combatting Network Complexity Using Structural Sparsity
With C. Hobbs†, K. Jasnik, B. Mork†, M. P. O'Brien*, F. Reidl, N. Rodrigues†.
Python software package providing proof-of-concept for an end-to-end pipeline for parameterized analytics in bounded expansion classes. Current modules use low-treedepth colorings to support subgraph isomorphism counting (motif counting).

INDDGO: Integrated Network Decomposition & Dynamic programming for Graph Optimization
With C. Groer, D. Weerapurage.
Serial and parallel C++/MPI codes supporting tree-decomposition-based dynamic programming routines for maximum weighted independent set. Primary development occurred while a staff member of Oak Ridge National Laboratory. Project hosted at: `http://github.com/bdsullivan/inddgo`.

Active Research Grants

Moore Investigator in Data-Driven Discovery: Enabling Science via Structural Graph Algorithms (PI)
Gordon & Betty Moore Foundation
$1,850,000 November 2014 – December 2021

Prior Research Support

Joint Faculty Appointment (PI)
Oak Ridge National Laboratory (ORNL), Computer Science & Mathematics Division
$205,144 2013 – 2019

Algorithms for Exploiting Approximate Network Structure (PI)
Army Research Office, Research Area 10: Network Science, co-PI: E. Demaine (MIT)
$538,199 2017 – 2019

Parameterized Algorithms Respecting Structure in Noisy Graphs (PARSiNG) (PI)
Defense Advanced Research Projects Agency (DARPA), GRAPHS Program
$249,200 2014 – 2017

*graduate students, †undergraduate students (direct mentees at time work performed).

Risk Mitigation of Infectious Diseases via Network Modeling and Mining (site PI)
NC Data Science and Analytics Initiative, co-PIs: D. Janies, X. Shi (UNC-Charlotte)
$150,000 (NCSU $75,000) 2015 – 2017

Tracking Community Evolution in Dynamic Graph Data Using Tree-Like Structure (PI)
Data Science Faculty Fellow
National Consortium for Data Science (UNC-Chapel Hill)
$30,000 2014 – 2015

Situation Awareness in Complex Networks (co-PI)
Oak Ridge National Laboratory LDRD[1] Program, PI: E. Ferragut (ORNL)
$650,000 2013 – 2015

Scalable Clustering Methods for Dynamic Health Data (co-PI)
NC State Research and Innovation Seed Funding (RISF), PI: A. Wilson (NCSU)
$26,000 2014

Pattern Discovery and Predictive Modeling on Heterogeneous Graphs using Cray's uRiKA (co-PI)
Oak Ridge National Laboratory LDRD Program, PI: R. Sukumar (ORNL)
$390,000 2013 – 2014

SPARTN: Sparse Projections Achieving Randomization in Tree-like Networks (PI)
DARPA GRAPHS Program, co-I: M. Mahoney (Stanford)
$415,000 2012 – 2014

Connecting Combinatorial and Geometric Tree-like Structure in Complex Networks (PI)
Oak Ridge National Laboratory LDRD SEED Fund
$200,000 2011 – 2012

Scalable Graph Decomposition and Algorithms to Support the Analysis of Petascale Data (PI)
Department of Energy, OASCR Applied Mathematics Program, co-PI: C. Groër
$1,200,000 2009 – 2012

Invited Presentations

Mathematical Biology Seminar, Georgia Institute of Technology, Atlanta, GA October 2019

Plenary, Parameterized Complexity & Practical Computing Workshop, Bergen, Norway August 2019

School of Computing Colloquium, University of Utah, Salt Lake City, UT January 2019

Keynote, Conf. on Combinatorial Optimization & Applications (COCOA), Atlanta, GA December 2018

Department of Mathematics Colloquium, University of Central Florida, Orlando, FL October 2018

Mathematics Department Colloquium, Georgia Institute of Technology, Atlanta, GA September 2018

Workshop on Structural Sparsity, Logic, and Algorithms, University of Warwick, UK July 2018

Data Institute Annual Conference (DSCO17), San Francisco, CA October 2017

AMS Southeastern Sectional Meeting, Orlando, FL October 2017
Special Session on Structural Graph Theory

Applied Topology Seminar, University of Pennsylvania March 2017

Cumberland Conference on Combinatorics, Graph Theory and Computing, Nashville, TN May 2017

[1] Laboratory Directed Research & Development

Duke Network Analysis Center Seminar, Duke University	November 2016
The Mathematics behind Big Data Analysis, SIAM DM16, Atlanta, GA	June 2016
Generalized Network Structures and Dynamics, Mathematical Biosciences Institute	March 2016
Mathematics for Data Science, ICERM, Providence, RI	July 2015
AWM Research Symposium, Baltimore, MD	April 2015
Capital Area Theory Seminar, University of Maryland	April 2015
Algorithms Seminar, Duke University	April 2015
PACM Colloquium, Princeton University	February 2015
Computer Science Seminar, Emory University	February 2015
ARC Colloquium, Georgia Institute of Technology	February 2015
Institute for Defense Analysis CCS Seminar, Bowie, MD	February 2015
AMS/MAA JMM, Workshop on the Mathematics of Network Science, San Antonio, TX	January 2015
Atlanta Lecture Series in Combinatorics and Graph Theory, Atlanta, GA	November 2014
AMS Southeastern Sectional Meeting, Greensboro, NC Special Session on Recent Advances in Graph and Hypergraph Theory	November 2014
Center for Imaging Science Seminar, Johns Hopkins University	November 2014
Algorithms Group Seminar, University of Bergen	August 2014
Computer Science Seminar, RWTH Aachen University, Germany	August 2014
Gordon & Betty Moore Foundation DDD Investigators Finalist Symposium, Palo Alto, CA	July 2014
Center for Nonlinear Studies Seminar, Los Alamos National Laboratory	June 2014
Topology and Geometry of Networks and Discrete Metric Spaces, IMA	April 2014
AMS Southeastern Sectional Meeting, Special Session on Graph Theory, Knoxville, TN	March 2014
Bertinoro Workshop on Algorithms and Graphs, Italy	December 2013
Theoretical Computer Science Group Seminar, RWTH Aachen University, Germany	December 2013
SAMSI Workshop on Social Network Data, RTP, NC	October 2013
Cumberland Conference on Combinatorics, Graph Theory & Computing, Murfreesboro, TN	May 2013
Center for Nonlinear Studies Colloquium, Los Alamos National Laboratory	May 2013
Combinatorics Seminar, Massachusetts Institute of Technology	April 2013
Industrial Engineering Seminar, University of Tennessee	April 2013
Computer Science Seminar, NC State University	March 2013
Computational Science & Engineering (CSE) Seminar, Georgia Tech	October 2012
SIAM Student Seminar, Emory University	October 2012
Applied Mathematics & Analysis Seminar, Duke University	October 2012

Applied Mathematics Colloquium, UNC-Chapel Hill	September 2012
Institute for Computing in Science (ICiS), Park City, UT	July 2012
Workshop on Massive Modern Data Sets (MMDS), Palo Alto, CA	July 2012
Applied Mathematics Colloquium, Duke University	April 2012
IMA Workshop: Large Graphs: Modeling, Algorithms, and Applications, Minneapolis, MN	October 2011
Virginia Bioinformatics Institute, Virginia Tech	September 2011
International Congress of Industrial and Applied Mathematics, Vancouver BC	July 2011
SAMSI Complex Networks Transitions Workshop, Research Triangle Park, NC	June 2011
Sandia National Laboratories, Livermore, CA	November 2010
Computer Science Colloquium, University of Georgia	October 2010
ORNL Computer Science and Mathematics Division Advisory Board	June 2010
CAAM Colloquium, Rice University	April 2010
Combinatorics Seminar, Georgia Tech	January 2010
Mathematics Department Junior Colloquium, University of Tennessee	September 2009
Princeton-Oxford Graph Theory Workshop, Oxford University, United Kingdom	June 2008
Oak Ridge National Laboratory, Computer Science & Mathematics Division	May 2008
Alfred Renyi Mathematics Institute, Budapest, Hungary	November 2007
Combinatorics Seminar, University of California, San Diego	October 2007
Microsoft Research Theory Group, Redmond, WA	October 2007
Discrete Math Seminar, Simon Fraser University, Canada	October 2007
Graph Theory Seminar, Georgia Tech	September 2007
Theory Group Seminar, Microsoft Research, Redmond, WA	April 2007
New York Number Theory Seminar, CUNY	February 2007

Tutorials

Complex Networks and Sparsity (I-IV). *Sparsity DocCourse*, Charles University Prague, Czech Republic	Nov-Dec, 2018
Exploiting Graph Structure in Algorithms. *ICERM Research Cluster*, Providence, RI	April, 2014

Teaching Experience

Instructor

- Graph Theory (CSC/MA/OR 565), NC State University — Spring 2018
  Instructor/Course Rating 4.3/4.3 [NCSU dept. average n/a] (included distance section)
- Parameterized Algorithms & Complexity (CSC 791/495), NC State University — Fall 2017
  Instructor/Course Rating 4.8/4.8 [NCSU dept. average n/a]
- Automata, Languages and Computability (CSC 333), NC State University — Spring 2017
  Instructor/Course Rating 4.4/4.0 [NCSU dept. average (s.e.m.) 4.0 (.10)/3.8 (0.14)]
- Computer Science Theory Reading Group (CSC 295/801), NC State University — Spr16, Fall16, Spr17
- Automata, Languages and Computability (CSC 333), NC State University — Fall 2015
  Instructor/Course Rating 4.3/4.5 [NCSU dept. average (s.e.m.) 4.1 (0.15)/4.3 (0.13)]
- Theory of Computation (CSC 707), NC State University — Fall 2014
  Instructor/Course Rating 4.7/4.5 [NCSU dept. average (s.e.m.) 4.0 (0.029)/4.0 (0.029)]
- Automata, Languages and Computability (CSC 333), NC State University — Fall 2014
  Instructor/Course Rating 4.5/4.3 [NCSU dept. average (s.e.m.) 4.0 (0.035)/3.9 (0.035)]
- Discrete Mathematics for Computer Scientists (CSC 226), NC State University — Spring 2014
  Instructor/Course Rating 4.2/3.9 [NCSU dept. average (s.e.m.) 3.8 (0.037)/3.7 (0.036)]
- Introduction to Calculus & Analytic Geometry (MAT 101), Princeton University — Fall 2006

Teaching Assistant

- Graph Theory (MAT 306), Princeton University, Spring 2006, Spring 2007
- Calculus II (Math 1502), Georgia Institute of Technology, Fall 2001, Spring 2002

Research Collaborations with Trainees

Graduate Students

Past Ph.D. Students:

- Michael P. O'Brien, NC State University, Computer Science (now at Google) — 2013 – 2018

Current Ph.D. Students:

- Andrew van der Poel, NC State University, Computer Science — 2014 – present
- Brian Lavallee, University of Utah, Computer Science — 2017 – present
- Michael Breen-McKay, NC State University, Mathematics (co-advised) — 2018 – present

Independent Study/Research Assistants:

- Michael Suggs, NC State University, Computer Science — Fall 2018
- Eric Horton, NC State University, Computer Science — 2017–2018 (MS), Fall 2018 (PhD)
- Timothy D. Goodrich, NC State University, Computer Science — 2014 – 2018
- Abida Haque, NC State University, Computer Science — Fall 2017
- William Hill, NC State University, Computer Science — Fall 2013

Interns (at Oak Ridge National Laboratory):

- Aaron Adcock (Stanford University) — 2011–2013
- Christine Klymko (Emory University) — 2012
- Zhibin Huang (University of Georgia) — 2010

Past Ph.D. Committees:

- Emily Barnard, NC State University, Mathematics — March 2017
  "The Canonical Join Representation in Algebraic Combinatorics" (advisor: Nathan Reading)
- James Elliott, NC State University, Computer Science — October 2015
  "Resilient Iterative Linear Solvers Running Through Errors" (advisor: Frank Mueller)
- Sadia Sharmin, University of Bergen, Computer Science — August 2014
  "Practical Aspects of the Graph Parameter Boolean-width" (advisor: Fredrik Manne)
- Aaron Adcock, Stanford University, Electrical Engineering — June 2014
  "Characterizing, Identifying, and Using Tree-like Structure in Social and Information Networks" (advisor: Gunnar Carlsson)

Postgraduates

- Kyle Kloster (now Software Engineer at Carbon) — 2016–2018
- Felix Reidl (now Lecturer at Birkbeck University of London) — 2016 – 2017
- Diego Galindo (now Technologist at Caterpillar) — 2012
- Charlotte Kotas (now Research Staff at ORNL) — 2012
- Dinesh Weerapurage, post-MS (now Sr. Software Developer at KPMG), — 2011 – 2012

Undergraduates

- Jing Guo — Fall 2019
- Hayley Russell — Fall 2018$^{\times}$
- Trey Woodlief — Spring 2018, Fall 2018, Spring 2019$^{\times,\dagger}$
- Allison Fisher — Fall 2017*, Spring 2018$^{\times}$
- Andrew Wright — Fall 2017*, Spring 2018*
- Eric Horton — Fall 2016*, Spring 2017*
- Jean-Claude Shore — Fall 2016$^{\times,\dagger}$, Spring 2017$^{\times,\dagger}$
- Yang Ho — Summer 2015, Fall 2015, Spring 2016^{+}
- Clayton Hobbs — Spring 2015$^{\times}$, Summer 2015, Spring 2016^{+}
- Nishant Rodrigues — Summer 2015, Fall 2015, Spring 2016^{+}
- Brandon Mork — Spring 2015$^{\times}$, Fall 2015*, Spring 2016^{+}
- Alex Chin (NCSU Undergraduate Research Grant Recipient) — Fall 2013, Spring 2014
- Matthew Farrell (Albertson College) — Summer 2013$^{\#}$
- Timothy Goodrich (Valparaiso University) — Summer 2013$^{\#}$

$*$ co-funded by NC State Provost's Professional Experience Program
$\times$ NC State Independent Research in Computer Science (CSC 499)
† NC State Honors Capstone
$+$ NC State Computer Science Senior Design Project (CSC 492)
\# DOE Science Undergraduate Laboratory Internship (SULI) program

High School Math Thesis Students

Oak Ridge High School, Oak Ridge, TN

- Megan Kelly and Neall Caughman — 2012
  Semifinalists in 2012 Siemens Competition.
- Gloria D'Azevedo — 2010
  Placed at state and national Junior Science & Humanities Symposium.

Selected Professional Activities

Internal Service

University of Utah School of Computing Committees

- Director Search Committee, 2019–2020
- Awards Committee, 2019–present
- Undergraduate Studies Committee, 2019–present

Organizer, NC State Theory Seminar, 2013 – 2019
`www.csc2.ncsu.edu/theoryseminar`

NC State Data Science Initiative Steering Committee & Advisory Council, 2016 – 2019

NC State Computer Science Algorithms & Theory Focus Group Lead, 2018 – 2019.

NC State Chancellor's Faculty Excellence Program Data-Driven Science Cluster Faculty Search Committee, 2015–2016

NC State Computer Science Department Committees

- Chair, Theory Faculty Search Committee, 2018–2019
- Awards Committee, 2017–2019
- Revamping First Year of Ph.D. Program Task Force, 2016–2017
- Actionable Faculty Goals Task Force, 2014–2015

Faculty Mentor (NC State Computer Science Department)

- Alessandra Scafuro, Assistant Professor, 2016–2019
- Katie Stolee, Assistant Professor, 2017–2019
- Hung-wei Tseng, Assistant Professor, 2017–2019

ORNL Women in Computing Advisory Board, 2012–2013

ORNL Computer Science & Mathematics Division Awards Committee, 2012

Leadership and Organization

Founding Vice-Chair (appointed), SIAM Activity Group on Applied & Computational Discrete Algorithms (SIAGACDA), 2019–2021.

Co-Organizer, Dagstuhl Seminar on Sparsity in Algorithms, Combinatorics and Logic, Spring 2020.

Vice-Chair (elected), SIAM Activity Group on Discrete Mathematics (SIAGDM), 2018–2020.

Co-Chair, SIAM Workshop on Network Science 2016

Steering Committee Member

- SIAM Workshop on Network Science, 2016–present
- Graph500 Benchmark (`http://www.graph500.org`), 2009–2012

Collaborative Research Event Leadership

- Collaborative Workshop for Women in Mathematical Biology; Research Group Co-Lead with C. Heitsch
  Institute for Pure and Applied Mathematics (IPAM) June 2019
  `https://www.ipam.ucla.edu/wbio2019`
- Barnraising for Data-Intensive Discovery; Co-Organizer with B. King, C. Greene, M. Turk
  MDI Biology Laboratory Spring 2016
  `https://mdibl.org/course/barnraising/`

- Research Cluster: Towards Efficient Algorithms Exploiting Graph Structure; Co-Organizer w/ E. Demaine, D. Marx
  Institute for Computational & Experimental Research in Mathematics (ICERM) Spring 2014
  `https://icerm.brown.edu/sp-s14/`

Minisymposia and Special Sessions Organized

- *Discrete Mathematics (and Theoretical Computer Science).*
  Special Session, Association of Women in Mathematics (AWM) Research Symposium, 2015
- *Treewidth: Connecting Fixed-Parameter Tractability, Graphical Models, and Sparse Linear Algebra.*
  Minisymposium, SIAM Computational Science & Engineering, 2013
- *Anomaly Detection Methods and Applications*
  Minisymposium, SIAM Southeastern Atlantic Sectional, 2013 (with R. Bridges)

Program Committees

- Complex Networks 2018, 2019
- SIAM Meeting on Algorithm Engineering & Experiments (ALENEX) 2018
- SIAM Workshop on Network Science (NS) 2017
- SIAM Discrete Mathematics (DM) 2016
- SIAM Workshop on Network Science (NS) 2015
- SIAM Workshop on Combinatorial Scientific Computing (CSC) 2014

Referee/Reviewer for Conferences, Journals, and Funding Agencies *including* Journal of the ACM; Discrete Mathematics; Combinatorics, Probability and Computing; SIAM Journal on Discrete Mathematics; SIAM Journal on Matrix Analysis and Applications; Combinatorica; Electronic Journal of Linear Algebra; SIAM Combinatorial Scientific Computing; SIAM Workshop on Network Science; Symposium on Theoretical Aspects of Computer Science (STACS), Workshop on Algorithm Engineering and Experiments (ALENEX), National Science Foundation (NSF), Army Research Office (ARO), and Department of Energy (DOE) Office of Science.

Outreach

Invited Presentations

- *Data Science Lunch and Learn*, Research Triangle Institute (RTI), RTP, NC October 2018
- *Research Horizons Seminar*, Georgia Institute of Technology, Atlanta, GA September 2018
- *Kennesaw State University, Infinite Horizons Lecture Series*, Marietta, GA April 2016
- *Oak Ridge National Laboratory, Women in Computing Brown Bag*, Oak Ridge, TN July 2015
- *National Institute for Environmental Health Sciences, Data Science Seminar*, RTP, NC April 2015
- *RTP 180°: Big Data*, Research Triangle Park, NC August 2014
- *SAMSI Education and Outreach Workshop*, Raleigh, NC May 2014
- *NCDS Data Innovation Showcase*, Chapel Hill, NC May 2014
- *SAMSI Education and Outreach Workshop*, Research Triangle Park, NC October 2013
- *PROMYS 20th Reunion*, Boston University, Boston, MA July 2009
- *Nassau Presbyterian Church Adult Education Series*, Princeton, NJ February 2007

Panels

- *R-Ladies RTP Meetup: Data Science Panel*
  Raleigh, NC October 2018
- *CMD-IT National Lab Professional Development Workshop for Underrepresented Participants*
  Moderator. Oak Ridge, TN June 2013
- *Emory University Math/CS Graduate Student Lunch & Learn Series*
  Atlanta, GA October 2012
- *National Lab Professional Development Workshop for Underrepresented Participants*
  Livermore, CA June 2012
- *Department of Homeland Security HS-STEM Career Pathways Conference*
  Washington, DC October 2010
- *Career Pathways for Future Homeland Security S&T Professionals*
  Washington, DC October 2008

Other

- *NC State Women in Computer Science (WiCS)*
  Regular participant in events; faculty judge at annual Symposium 2013–present
- *Reddit Science AMA Series*
  Moore DDD Investigators January 2015
  `www.reddit.com/r/science/comments/2teeeg/science_ama_series_we_are_moore_investigators_and/`
- *Video Interview* for STEMBrite "Mindsets for Computer Science" series (used in CSC116).
  NC State University Spring 2014
- *Head Counselor*, Program in Mathematics for Young Scientists (PROMYS)
  Boston University, Boston, MA Summer 2001

Professional Memberships

Association of Computing Machinery (ACM)

Americal Mathematical Society (AMS)

Society for Industrial and Applied Mathematics (SIAM)