SAMI DAVIES

email sami@northwestern.edu
website samidavies.com
position Post-doc at Northwestern CS

Research Objective

To design algorithms for combinatorial optimization problems that go beyond worst-case analysis in order to (1) develop a more complete theoretical understanding of a problem's difficulty and (2) provide performance guarantees that are representative of what happens in practice.

Education

University of Washington
2016–2021 Ph.D. in Mathematics

University of Illinois at Chicago
2015–2016 M.S. in Mathematics

Carnegie Mellon University
2011–2015 B.S. in Mathematics
Minor in Economics, College and University Honors

Publications

[1] *Feb. 2023* Fast Combinatorial Algorithms for Min Max Correlation Clustering
ICML 2023 Sami Davies, Benjamin Moseley, Heather Newman

[2] *Oct. 2022* Predictive Flows for Faster Ford-Fulkerson
ICML 2023 Sami Davies, Benjamin Moseley, Sergei Vassilvitskii, Yuyan Wang

[3] *July 2022* Robust Factorizations and Colorings of Tensor Graphs
In submission Joshua Brakensiek, Sami Davies

[4] *Feb. 2022* Balancing Flow Time and Energy Consumption
SPAA 2022 Sami Davies, Samir Khuller, Shirley Zhang

[5] *Sept. 2021* New Lower Bounds on the Total Variation Distance Between Mixtures of Two Gaussians
ALT 2022 Sami Davies, Arya Mazumdar, Soumyabrata Pal, Cyrus Rashtchian

[6] *July 2021* On the Hardness of Scheduling with Non-Uniform Communication Delays
SODA 2022 Sami Davies, Janardhan Kulkarni, Thomas Rothvoss, Sai Sandeep, Jakub Tarnawski, Yihao Zhang

[7] *July 2021* Approximate Trace Reconstruction: Algorithms
ISIT 2021 Sami Davies, Miklós Z. Rácz, Benjamin Schiffer, Cyrus Rashtchian

[8] *July 2020* Scheduling with Communication Delays via LP Hierarchies and Clustering II: Weighted Completion Times on Related Machines
SODA 2021 Sami Davies, Janardhan Kulkarni, Thomas Rothvoss, Jakub Tarnawski, Yihao Zhang

[9] *April 2020* Scheduling with Communication Delays via LP Hierarchies and Clustering
FOCS 2020 Sami Davies, Janardhan Kulkarni, Thomas Rothvoss, Jakub Tarnawski, Yihao Zhang

[10] *July 2018* A Tale of Santa Claus, Hypergraphs and Matroids
SODA 2020 Sami Davies, Thomas Rothvoss, Yihao Zhang

[11] *Jan. 2019* Reconstructing Trees from Traces
COLT 2019 Sami Davies, Miklós Z. Rácz, Cyrus Rashtchian. Full version in the Annals of Applied Probability 31(6): 2772–2810, 2021

Recent Invited Participation and Internships

Sept. 2023 Simons Institue
Program on Logic and Algorithms in Database Theory and AI

Sept. 2023 Banff International Research Station (BIRS)
Approximation Algorithms and the Hardness of Approximations workshop

Feb. 2023 Dagstuhl Seminar in Scheduling
1 of 5 invited hour long talks

Oct. 2022 EECS Rising Stars
Workshop, held at UT Austin in 2022

June 2022 TCS Women Rising Stars at STOC 2022
Virtual talk on robust tensor factorization

May 2022 IDEAL Workshop on Algorithms for Massive Data Sets
Virtual talk on learning-augmented algorithms

May 2021 CanaDAM(Canadian Discrete and Algorithmic Mathematics)
Virtual talk on scheduling with communication delays

Summer 2020 Microsoft Research, Redmond Intern
Hosted by Janardhan Kulkarni and Jakub Tarnawski in the Algorithms group

Feb. 2020 Dagstuhl Seminar in Scheduling
Talk on the Santa Claus problem

Awards and Fellowships

2021-2023 NSF Computing Innovation Fellow
Awarded funding for a two-year post-doctoral fellowship

2020 Tanzi-Egerton Fellow
Awarded to an outstanding senior graduate student in mathematics at UW

2020 **Microsoft Research Dissertation Grant**
Awarded to ten graduate students in computer science across the US

2017-2019 **McKibben and Merner Endowed Fellowship in Mathematics**
Awarded to two mathematics Ph.D. students at UW who were exceptional in their preliminary exams and first-year courses

Teaching

I taught the following courses:

Math 107	Math in Society	FEPPS Summer 2018
CSE 311	Foundations of Computing I	UW Spring 2020

I served as a teaching assistant for the following courses:

Math 111	Algebra with Applications	UW Fall 2017
Math 124	Calculus I	UW Winter & Spring 2017
Math 126	Multivariable Calculus	UW Fall 2016
Math 121	Pre-Calculus	UIC Fall 2015 & Spring 2016
21-241	Matrices & Linear Transformations	CMU Spring 2015

Service and Outreach

External Reviewer
SODA 2020, ICALP 2020, *IEEE Transactions on Information Theory*, MFCS 2020, ISAAC 2020, *Operations Research*, PODS 2021, WADS 2021, ICALP 2021, STOC 2022, ICALP 2022, ESA 2022, *Discrete Mathematics*, ISAAC 2022, SODA 2023, *Algorithmica*, FOCS 2023

PC Member
APPROX 2023, WAOA 2023, IPCO 2024

Dec. 2021 **Co-organizer 2021 Northwestern Junior Theorists Workshop**
Co-organized a workshop highlighting rising theoretical computer scientists. https://theory.cs.northwestern.edu/events/2021-junior-theorists-workshop/

2018-2021 **Washington Directed Reading Program**
Mentored for the WDRP, a program that pairs undergraduate students with graduate students for independent reading projects. Helped conceive and write grants for the WDRP in summer 2018.

2021 **Mastery Learning Hour**
Tutored math for K-12 students. Provided support to students during COVID-19 pandemic.

2017-2019 **Freedom Education Project Puget Sound (FEPPS)**
Tutored incarcerated women during the fall and winter of 2017. Served as the course co-instructor for Math 107 during the summer of 2018 at the Washington Corrections Center for Women.

2018 **Math Circle**
Served as an instructor during the spring of 2018.