Nicolas H. Christianson

Caltech CMS
nchristi@caltech.edu
nicochristianson.com

EDUCATION

California Institute of Technology, *Ph.D. in Computing and Mathematical Sciences* 2020–25 (expected)
Supported by NSF Graduate Research Fellowship, 2021–
Advisors: Adam Wierman and Steven Low
Research interests: Online algorithms, machine learning, energy systems/markets

Harvard College, *A.B. summa cum laude in Applied Mathematics* 2016–20
Honors: Phi Beta Kappa Junior 24, Detur Book Prize, John Harvard Scholar. *GPA*: 3.976/4.0.

RESEARCH

Caltech – *Rigorous Systems Research Group* and *Netlab* 2020–
Online algorithms

- Designing machine learning-augmented algorithms for online/sequential decision-making problems such as online optimization, metrical task systems, *k*-server
- Investigating algorithm deployment in real-world energy settings with an industry collaborator

Energy grid/markets

- Developing algorithms and market mechanisms for efficient and robust grid planning and operation via robust optimization

Harvard – *Materials Intelligence Research Group* 2019–20

- Utilized Monte Carlo methods and mean-field theory to study disorder-induced conductivity in solid-state electrolytes for a senior thesis in Applied Mathematics; advised by Boris Kozinsky

UPenn – *Complex Systems Group* Summer 2018–19

- Applied tools from network science, natural language processing, and applied topology to study semantic structure in texts and human learning; advised by Dani Bassett

INDUSTRY EXPERIENCE

The Boston Consulting Group – Summer Associate | Boston, MA Summer 2019
Partnered with a top-10 global biopharmaceutical company to optimize its supply and manufacturing networks, using data and digital-driven techniques to forecast production needs and increase efficiency

Covance – Data Science Intern | Princeton, NJ Summer 2017
Developed statistical and machine learning models to forecast clinical trial patient recruitment

PROGRAMMING SKILLS

Experienced in Python (including PyTorch, PyStan, Pandas, Numpy); familiar with OCaml.

PUBLICATIONS

*equal contribution

N. Christianson, T. Handina, A. Wierman. "Chasing convex bodies and functions with black-box advice." *Conference on Learning Theory*. PMLR, 2022.

D. Rutten, **N. Christianson**, D. Mukherjee, A. Wierman. "Online Optimization with Untrusted Predictions." Preprint: *arXiv:2202.03519*.

N. Christianson*, L. Werner*, A. Wierman, S. Low. "Dispatch-aware planning for feasible power system operation." *Electric Power Systems Research* 212 (2022): 108597.

W. Qian, C.W. Lynn, A.A. Klishin, J. Stiso, **N.H. Christianson**, D.S. Bassett. "Optimizing the human learnability of abstract network representations." *Proceedings of the National Academy of Sciences* 119.35 (2022): e2121338119.

A.A. Klishin, **N.H. Christianson**, C.S.Q. Siew, D.S. Bassett. "Learning Dynamic Graphs, Too Slow." Preprint: *arXiv:2207.02177*.

N.H. Christianson, A.S. Blevins, D.S. Bassett. "Architecture and evolution of semantic networks in mathematics texts." *Proceedings of the Royal Society A* 476.2239 (2020): 20190741.

N.J. Porter, **N.H. Christianson**, C. Decroos, D.W. Christianson. "Structural and Functional Influence of the Glycine-Rich Loop G302GGGY on the Catalytic Tyrosine of Histone Deacetylase 8." *Biochemistry* 55.48 (2016): 6718-6729.

C. Decroos, **N.H. Christianson**, L.E. Gullett, C.M. Bowman, K.E. Christianson, M.A. Deardorff, D.W. Christianson. "Biochemical and Structural Characterization of HDAC8 Mutants Associated with Cornelia de Lange Syndrome Spectrum Disorders." *Biochemistry* 54.42 (2015): 6501-6513. *Selected as "ACS Editors' Choice."*

PRESENTATIONS

Chasing Convex Bodies and Functions with Black-Box Advice

- Asilomar Conference on Systems and Signals, November 2022 (**invited talk**).
- Seminar on Algorithms with Predictions, UMass Amherst, October 2022 (**invited talk**).
- INFORMS Annual meeting, October 2022 (**invited talk**).
- Conference on Learning Theory (COLT), July 2022.

Dispatch-aware planning for feasible power system operation

- Power Systems Computation Conference (PSCC), June 2022.

MENTORSHIP, TEACHING, AND LEADERSHIP

Undergraduate students advised

Junxuan (Helen) Shen — Spring 2022–
Topic: Multi-agent online optimization with machine-learned advice

Jerry Huang — Spring 2022–
Topic: Uncertainty quantification in learning-augmented online algorithms

Mentorship

PhD application mentor – *Project SHORT* — Fall 2020–

Graduate application mentor – *Caltech Accountability Partners Program* — Fall 2022

Teaching

Peer Tutor – *Harvard Academic Resource Center* — 2018–20

Course Assistant, Math Ma – *Harvard Math Department* — Fall 2017

Leadership

Captain, Adams House Rowing Club — 2018–20

HONORS AND AWARDS

NSF Graduate Research Fellowship	2021
Phi Beta Kappa Junior 24 (Harvard)	2019
John Harvard Scholarship (Harvard)	2017, 19
Blair Research Fellowship (UPenn)	Summer 2018
Detur Book Prize (Harvard)	2018
National Merit Scholarship	2016