NICOLAS H. CHRISTIANSON

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EDUCATION

California Institute of Technology   Pasadena, CA
Incoming PhD student in Computing and Mathematical Sciences. GRE: 170Q, 170V, 6W.

Harvard University   Cambridge, MA
A.B. in Applied Mathematics, Summa Cum Laude. GPA: 3.976/4.0.   May 2020
Phi Beta Kappa Junior 24. John Harvard Scholar.
Graduate-level Coursework: Advanced Machine Learning; Information Processing and Statistical Physics;
Learning, Estimation, and Control of Dynamical Systems; Computational Design of Materials; Physical Mathematics.

RESEARCH EXPERIENCE

Senior Thesis   September 2019 – Present
Harvard University Materials Intelligence Research Group   Cambridge, MA

Conducted research for a senior thesis in Applied Mathematics supervised by Professor Boris Kozinsky focused on the role of disorder in facilitating ionic conduction in solid-state electrolytes using Monte Carlo simulations and mean-field modeling. Currently running molecular dynamics simulations to investigate the applicability of the mean-field approach to real lithium conductors, with the intention of writing the work up as a paper for journal submission.

Undergraduate Research Assistant   June 2018 – September 2019
University of Pennsylvania Complex Systems Group   Philadelphia, PA

Worked under Professor Danielle Bassett (2014 MacArthur Fellow) using techniques from network science, natural language processing, and applied algebraic topology to characterize the structure and development of semantic networks of concepts in textbooks, with the goal of better understanding the relationship between knowledge organization and learning. Supported by the Blair Research Fellowship during summer 2018, and continued work through academic year 2018-19 and summer 2019. Resulted in one first-author paper, accepted at Proceedings of the Royal Society A.

Research Assistant   December 2016 – May 2017
Harvard University Department of Mathematics | Cambridge, MA

Pursued research in pure mathematics under Dr. Eric Peterson (Benjamin Pierce Fellow), applying results from commutative algebra to perform automated computation on spectral sequences, a useful tool in algebraic topology and homological algebra.

Summer Research Intern   June 2014 – August 2014, June 2015 – August 2015
University of Pennsylvania Department of Chemistry | Philadelphia, PA

Studied histone deacetylase 8 (HDAC8) through molecular dynamics simulations and wet lab work. Resulted in two publications.

TECHNICAL SKILLS

Programming: Python (primary), OCaml, C++.
Machine learning/statistical modeling: PyTorch, Stan, scikit-learn.
Molecular dynamics and DFT software: LAMMPS, GROMACS, Quantum Espresso.
Other: LaTeX, Adobe Illustrator.

PUBLICATIONS

Christianson, N. H., Blevins, A. S., and Bassett, D. S. (2020) Architecture and evolution of semantic networks in mathematics texts. **Proceedings of the Royal Society A** *476*, 20190741.

Porter, N. J., **Christianson, N. H.**, et al. (2016) Structural and Functional Influence of the Glycine-Rich Loop G302GGGY on the Catalytic Tyrosine of Histone Deacetylase 8. **Biochemistry** *55*, 6718-6729.

Decroos, C., **Christianson, N. H.**, et al. (2015) Biochemical and Structural Characterization of HDAC8 Mutants Associated with Cornelia de Lange Syndrome Spectrum Disorders. **Biochemistry** *54*, 6501-6513. **Selected as "ACS Editors' Choice."**

OTHER EXPERIENCE

Summer Associate   June 2019 – August 2019
The Boston Consulting Group   Boston, MA
Worked in the biopharmaceutical operations practice, partnering with a top-10 global pharmaceutical company to optimize one of its supply and manufacturing networks. Performed quantitative analysis to identify potential production gaps, and used advanced statistical models to forecast production needs for cutting-edge therapeutic platforms; advised the client on modern, data- and digital-driven techniques for increasing production efficiency.

Data Engineering, Predictive Analytics, and Informatics Intern   May 2017 – August 2017
Covance, Inc.   Princeton, NJ

Studied and implemented numerous statistical and machine learning methods using Python and Stan to model, simulate, and forecast patient recruitment in clinical trials, to aid in de-risking and increasing the efficiency of the patient recruitment process.

HONORS AND AWARDS

John Harvard Scholarship	Harvard University, Fall 2019
Phi Beta Kappa Junior 24	Harvard University, April 2019
Harvard College Scholarship	Harvard University, Fall 2018
Blair Research Fellowship	University of Pennsylvania, Summer 2018
Detur Book Prize	Harvard University, February 2018
John Harvard Scholarship	Harvard University, Fall 2017
National Merit Scholarship	2016

TERM-TIME JOBS AND ACTIVITIES

Peer Tutor (Math, Applied Math, Computer Science, and Statistics courses)	January 2018 – May 2020
Team Captain, Adams House Rowing Club	February 2018 – March 2020
Course Assistant in Mathematics	September 2017 – December 2017