

# Mason DiCicco

Worcester Polytechnic Institute, UH347  
Worcester, MA 01609  
☎ (860) 882 7015  
✉ [mtdicicco@wpi.edu](mailto:mtdicicco@wpi.edu)

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## Education

- 2020-2025 **Ph.D. Computer Science**, *Worcester Polytechnic Institute*, 4.0 GPA.  
Advised by Daniel Reichman
- 2016-2020 **B.S. Computer Science**, *University of Connecticut*, 3.9 GPA.  
Concentration: Theory and Algorithms
- 2016-2020 **B.A. Mathematics**, *University of Connecticut*, 3.9 GPA.  
Concentration: Pure Mathematics

## Coursework

- Graduate Level Mathematics Combinatorics, Analysis, Algebra, AI, Reinforcement Learning, Deep Learning, Networks.
- Mathematics Abstract/Linear Algebra, Differential Equations, Analysis, Topology, Probability.
- Computer Science Systems Programming, Computer Architecture, Algorithms and Complexity, Machine Learning, Computational Geometry, Operating Systems, Modern Cryptography, Numerical Methods.

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## Research Experience

- September 2020 - Present **Graduate Student**, *Worcester Polytechnic Institute*, Advisor: Daniel Reichman.  
Studying topics in theoretical computer science, proving hardness results in communication and learning complexity, statistical inference, and circuit complexity.
- September 2022 **Research Visit**, *Santa Fe Institute*, Host: Cris Moore.  
Developed combinatorial methods for proving upper bounds on the expected length of the longest common subsequence of random strings (i.e., the Chvatal-Sankoff constant).

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## Publications

### Accepted papers

- May 2021 - September 2022 **The Learning and Communication Complexity of Subsequence Containment**, *WPI*, CS Department.  
Proved tight bounds on the complexity of subsequence detection. (ISIT 2023.)
- December 2022 - May 2023 **Inoculation Strategies for Bounded Degree Graphs**, *WPI*, CS Department.  
Proved tight bounds on the price of anarchy for an abstract model of epidemic containment. (TCS)
- January 2024 - October 2024 **The Karp Dataset**, *WPI*, CS Department.  
Introduced a dataset of NP-hardness reductions. (NeurIPS 2024.)
- November 2023 - January 2024 **Nearest Neighbor Complexity and Boolean Circuits**, *WPI*, CS Department.  
Studied the representational complexity of the nearest-neighbor classification rule. (ITCS 2025)

### Preprints and other projects

- May 2018 - August 2018 **Markov Coupling**, *UCONN*, Math Department REU.  
Proved upper bounds on the coupling-times of Markov chains under various restrictions.  
[https://opencommons.uconn.edu/srhonors\\_theses/709/](https://opencommons.uconn.edu/srhonors_theses/709/)

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## Professional Experience

- May 2023 - **Naval Research Lab, Washington, D.C..**  
July 2023
  - Implemented physics-informed neural networks, universal differential equations for practical applications.
  - Generalized spectral neural operators to improve performance on localized data.
- June 2019 - **Naval Information Warfare Center, San Diego, CA.**  
August 2019
  - Researched topological data analysis approaches to analyzing neural network behavior.
  - Neuromorphic computing: Developed a spiking neural network (SNN) simulator.
- July 2015 - **United Technologies Aerospace Systems, Windsor Locks, CT.**  
September 2015
  - Created an accurate computer simulation of the Integrated Fuel Pump Control system.

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## Talks

- March 2024 **Communication complexity and linear arrangements,**  
*Discrete Math Seminar, WPI.*
- July 2024 **Nearest neighbor comoplexity and boolean circuits,**  
*CS Theory Seminar, Tufts University.*
- November 2023 **Threshold circuit lower bounds from communication complexity,**  
*Discrete Math Seminar, WPI.*
- September 2023 **Introduction to nearest neighbor complexity,**  
*Discrete Math Seminar, WPI.*
- September 2022 **Expected length of the longest common subsequence,**  
*Discrete Math Seminar, WPI.*
- October 2021 **The communication complexity of subsequence detection,**  
*Discrete Math Seminar, WPI.*

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## Teaching Experience

- (Many instances) **Foundations of Computer Science, Teaching Assistant, WPI.**  
Introduction to finite automata, context-free grammars, and Turing machines.
- (Many instances) **Introduction to Machine Learning, Teaching Assistant, WPI.**  
Regression, MLE, clustering, neural networks.
- (Many instances) **Algorithms: Design and Analysis, Teaching Assistant, WPI.**  
Divide and conquer, dynamic programming, etc., amortized analysis, NP completeness

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## Specific Skills

- Programming Python, Julia, Java, C, C++, Javascript (node.js)
- Implementations Deep Learning, Convolutional/Recurrent Networks, Reinforcement Learning, Few-Shot Learning, Meta Learning, Evolutionary Algorithms, Neuromorphic Computing (Pytorch, Tensorflow, OpenAI Gym.)