

# Clayton H. Sanford

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## EDUCATION

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### Columbia University

September 2019 - May 2024 (expected)

*Ph.D. Student in Computer Science*

*M.S in Computer Science (Feb. 2021)*

*GPA: 4.24/4.33*

- Advisors: Rocco Servedio and Daniel Hsu

### Brown University

September 2014 - May 2018

*Sc.B. with Honors in Applied Mathematics - Computer Science*

*GPA: 3.9/4.0*

- Thesis: “Applying Rademacher-Like Bounds to Combinatorial Samples and Function Selection.”
- Thesis Advisor: Eli Upfal; Concentration Advisor: Caroline Klivans
- Magna Cum Laude

## PUBLICATIONS

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D. Hsu\*, C. Sanford\*, R. Servedio\*, E.-V. Vlatakis-Gkaragkounis\*. “Near-Optimal Statistical Query Lower Bounds for Agnostically Learning Intersections of Halfspaces with Gaussian Marginals.” *Preprint*, 2022.

C. Sanford, V. Chatziafratis. “Expressivity of Neural Networks via Chaotic Itineraries beyond Sharkovsky’s Theorem.” *Appearing at AISTATS*, 2022.

T. Chin\*, J. Ruth\*, C. Sanford\*, R. Santorella\*, P. Carter\*, B. Sandstede\*. “Enabling equation-free modeling via diffusion maps.” *Journal of Dynamics and Differential Equations*, 2022.

N. Ardeshir\*, C. Sanford\*, D. Hsu. “Support vector machines and linear regression coincide with very high-dimensional features.” *Neural Information Processing Systems*, 2021.

D. Hsu\*, C. Sanford\*, R. Servedio\*, E.-V. Vlatakis-Gkaragkounis\*. “On the Approximation Power of Two-Layer Networks of Random ReLUs.” *Conference on Learning Theory*, 2021.

K. Cygan\*, C. Sanford\*, W. Fairbrother. “Spliceman2 - A Computational Web Server That Predicts Sequence Variations in Pre-mRNA Splicing.” *Bioinformatics* 33 (18), 2017.

J. Gross\*, C.Sanford\*, G. Kocks\*. “Projected Water Needs and Intervention Strategies in India.” *Undergraduate Mathematics and its Applications* 37 (2), 2016.

\* Contributed equally

## FELLOWSHIPS AND AWARDS

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### NSF GRFP Fellowship

March 2021

*National Science Foundation*

- Competitive fellowship that provides three years of full funding for graduate research.

### Department Service Award

May 2020

*Columbia Computer Science*

### Computer Science Senior Prize

May 2018

*Brown Computer Science*

- Cash prize awarded to the top students in the computer science department based on academic achievement and department service.

### **Outstanding Winner**

April 2016

*Interdisciplinary Contest in Modeling*

*Consortium for Mathematics and its Applications*

- Designation given to five out of over 3000 teams for mathematical modeling of water scarcity in the ICM contest.

## **INDUSTRY EXPERIENCE**

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### **Software Engineering Intern**

April 2019 - August 2019

*Lumi Labs*

- Front-end and back-end development with direct ownership of new features core to the product.

### **Associate Analytics Data Scientist**

August 2018 - April 2019

*LinkedIn*

- Used Hive and SQL to create stable and frequently-used datasets that repopulate daily.
- Performed deep-dive analyses on open questions for the LinkedIn Learning product.
- Co-coordinated a bi-weekly machine learning reading group.

### **Data Analytics Intern**

June 2017 - August 2017

*LinkedIn*

- Analyzed subscription patterns with LinkedIn Learning team using Pig, HDFS, SQL, and Python.
- Contextualized findings in the Learning business and presented to stakeholders.

## **RELEVANT COURSEWORK**

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**Algorithms and Theory:** Models of Computation, Analysis and Design of Algorithms, Advanced Algorithms Seminar, Computational Linear Algebra, Intro to Cryptography, Randomized Algorithms, Computation and the Brain

**Artificial Intelligence:** Machine Learning, Artificial Intelligence, Foundations of Prescriptive Analytics, Independent Study for ML research, Optimization Methods for ML, ML Theory, Algorithmic Game Theory

**Probability and Statistics:** Probability and Computation, Information Theory, Recent Applications in Probability and Statistics, Probabilistic Methods in Computer Science

**Dynamical Systems:** Applied Ordinary Differential Equations, Applied Partial Differential Equations I, Topics in Chaotic Dynamics, Independent Study for Dynamical Systems Research

**Pure Mathematics:** Linear Algebra, Abstract Algebra, Analysis: Functions of One Variable

**Non-Technical:** Persuasive Communication, Classrooms in Context: Public Education in Providence

## **TEACHING EXPERIENCE**

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### **Graduate Teaching Assistant**

January 2021 - April 2021

*Columbia University Department of Computer Science*

- Holds office hours, grades assignments, and prepares course materials for Introduction to Computational Learning Theory.

### **Head Teaching Assistant**

April 2017 - December 2017

*Brown University Department of Computer Science*

- Led a staff of 14 UTAs through grading assignments, running review sessions, and holding office hours.
- Hired UTAs after interviewing 35 candidates for the job.
- Managed an Algorithms class with 170 students and coordinated interactive grading sessions and exams.
- Taught an supplemental section on NP-hardness to a group of forty students for 90 minutes.
- Brainstormed, wrote-up, and edited problems for homework assignments and exams.

### **Undergraduate Teaching Assistant**

September 2015 - May 2017

*Brown University Departments of CS and Applied Math*

- Served on the course staffs of four courses: Accelerated Intro to CS, Discrete Structures and Probability, Theory of Computation, Topics in Chaotic Dynamics.
- Created problems for and graded homework assignments and exams.
- Hosted office hours for helping students understand course material and solve homework problems.

### **Tutor and Volunteer Representative**

January 2015 - May 2016

*Swearer Tutoring Enrichment in Math and Science (STEMS)*

- Tutored math and science in class and after school at a nearby public school in Providence.
- Interviewed potential volunteers and planned meetings to help train tutors.

### **Tutor**

September 2011 - June 2014

*Soquel High School*

- Tutored math at homework club after school twice a week for three years.

## **DEPARTMENT SERVICE**

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- Ran events at and coordinated the Columbia Visit Day for admitted students in Spring 2020.
- Started the Columbia Theory Student seminar, where students share their research on a weekly basis.
- Advised two cohorts of undergraduate theory seminars on ML theory.
- Planned the Columbia TCS student retreat for fall 2021.

## **LEADERSHIP AND MENTORSHIP EXPERIENCE**

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### **President**

February 2015 - May 2018

*Applied Math Department of Undergraduates (APMA DUG)*

*Brown University*

- Hosted well-attended advising panels for students interested in Applied Math courses and research.
- Created problems for and managed a casual math competition every semester.
- Coordinated lectures by Applied Math faculty members for undergrads every semester.
- Welcomed prospective students and new concentrators by planning department-sponsored celebrations.

### **President**

November 2014 - May 2018

*Outing Club*

*Brown University*

- Led an executive board of forty members that ran trips every weekend of the academic year.
- Managed and apportioned a \$27000 annual budget.
- Recruited, interviewed, and trained new trip leaders.

### **Peer Advisor**

September 2017 - May 2018

*Matched Advising Program for Sophomores (MAPS)*

*Brown University*

- Advised two sophomore Applied Math students as they declared their concentrations and decided on coursework and internships.

**Peer Advisor***Meiklejohn Peer Advisory Program*

September 2015 - May 2017

*Brown University*

- Advised eleven first year students on adjusting to college life, selecting courses, building connections, and finding their academic paths.

**MISCELLANEOUS**

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**Programming Languages**

Python, Java, Matlab, SQL, Scala, Javascript, PHP, Perl, LaTeX, SQL

**Technologies**

Hadoop, Spark, Git, Tensorflow

**Spoken Languages**

English (native), Spanish (intermediate proficiency)

**Other Interests**

Backpacking, Running, Climbing, Cooking, New York, Public Transportation