

# Curriculum Vitae

**Zachary S. Siegel**

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Department of Computer Science

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## **Education**

Princeton University, 2021 – 2025

B.S.E. in Computer Science

Minors in Philosophy and Mathematics

Columbia University, School of Professional Studies, 2020 – 2021

Scarsdale High School, 2017 – 2021

Stanford Online High School, 2016 – 2020

## **Publications**

### **Preprints**

T. Galanti, Z. Siegel, A. Gupte, T. Poggio. (2022). “SGD and Weight Decay Provably Induce a Low-Rank Bias in Deep Neural Networks.” <https://arxiv.org/abs/2206.05794>.

### **2021**

Siegel, Zachary & Kulp, Scott. (2021). “Superimposing Height-Controllable and Animated Flood Surfaces into Street-Level Photographs for Risk Communication.” *Weather and Climate Extremes*. 32. 100311. 10.1016/j.wace.2021.100311.

## **Workshops**

### **2022**

Tomer Galanti, Tomaso Poggio, Zachary S. Siegel. (2022). “SGD Noise and Low-Rank Bias in Deep Neural Networks,” Deep Math Conference.

## **Talks**

### **2020**

Siegel, Zachary & Kulp, Scott. (2020). “Fast and Flexible Composition of Animated Flood Surfaces into Street-Level Photographs.” American Geophysical Union Fall 2020 Meeting, Oral Presenter.

## **Research**

### **Poggio Lab, MIT**

*Undergraduate Research Assistant, May 2022 – Present*

[poggio-lab.mit.edu](http://poggio-lab.mit.edu)

Undergraduate Research Assistant for the Poggio Lab at the Center for Brains, Minds, and Machines at MIT. Analyzing the low-rank bias in the weight matrices of neural networks from both theoretical and empirical perspectives.

### **Human Computer Interaction Lab, Princeton University**

*Undergraduate Research Assistant, Spring 2022*

[hci.princeton.edu](http://hci.princeton.edu)

Developed models to simulate efficiency of decentralized, gig-economy work, such as ride-sharing and food-delivery platforms. Utilized agent-based modeling software to determine how changes to driver dispatch algorithms affect overall system performance, with an emphasis on improving working-conditions for gig-economy workers.

### **Climate Central**

*Research Intern, 2018 – 2022*

[www.climatecentral.org](http://www.climatecentral.org)

Developed applications to superimpose the ocean onto street level images to warn residents about the risks of flooding, by leveraging machine learning for depth completion of sparse LIDAR data, Blender to render the ocean, and novel techniques to generate a composite image that contains both rendered ocean water and a real street level image.

### **Teaching**

Course Assistant, MAT 204: Advanced Linear Algebra with Applications, Spring 2023

Course Assistant, MAT 203: Advanced Vector Calculus, Fall 2022

Precept Assistant, COS 226: Algorithms and Data Structures, Spring 2022

### **Experience**

#### **Youth Passion Project Inc.**

*Chairman of the Board, August 2020 – Present*

*Founder and President, March 2020 – June 2021*

[www.youthpassionproject.org](http://www.youthpassionproject.org)

Founded the Youth Passion Project, a 501(c)(3) non-profit organization that provides a platform for high school students to teach classes to elementary and middle school learners. Courses taught on subjects not commonly found in school, including Introduction to Origami, Basics of 3D Modeling, Intermediate Sanskrit, and more. Managed a team of over 200 instructors comprising 8 chapters throughout the world with over 2,000 student sign ups.

#### **Golf This Spring**

*Founder and Co-President, 2017 – 2021*

Founded Golf This Spring, an organization that promotes adaptive golf in Westchester County.

Led the team in hosting fundraiser events, raising money, purchasing an adaptive wheelchair, and

promoting its use. Raised over \$7,000 and purchased the wheelchair to make golf more accessible for people with disabilities.

### **Lincoln-Douglas Debate Team**

*Captain of Debate, 2020 – 2021*

*Officer, 2019 – 2020*

*Member, 2017 – 2019*

Organized tournament logistics for Lincoln-Douglas debate, including registration for tournaments, travel plans, and hotel bookings. Taught freshmen debate by developing curricula, holding lessons, facilitating practice rounds, and coaching them during tournaments. Instructed novices from other lower income schools through a program called [Pep Talk Debate](#). Ranked 18th nationally.

### **Robotics Team**

*Co-Captain, 2020 – 2021*

*Director of Engineering, 2018 – 2020*

*Member, 2017 – 2018*

[www.scarsdalerobotics.com](http://www.scarsdalerobotics.com)

Co-Captain of the Scarsdale Robotics team. Managed a team of thirty members, overseeing engineering, programming, and outreach efforts. Facilitated communication within and between departments, coordinated strategy for competition, and taught new members the basics of engineering. Coordinated an effort for the team to tackle real-world problems that have solutions to benefit our local community during COVID-19 pandemic.

### **Selected Projects**

#### **Circuit Debater**

[ld.circuitdebater.org](http://ld.circuitdebater.org)

Created circuitdebater.org to allow debaters to post arguments, readings, and other resources to benefit students from lower-income communities without adequate access to coaching resources. Learned Google Compute Engine, PHP, MySQL, Linux, and Media Wiki to implement project. 1,000+ users.

#### **Coding Tutorials**

[www.codingtutorials.org](http://www.codingtutorials.org)

While in middle school, produced tutorial videos on the Scratch programming language to help younger students learn to code. Expanded project to help K-12 teachers implement Scratch in their classrooms.

#### **Publicity**

[Podcast Episode](#), The Genius Generation, May 2021

[Segment on Youth Passion Project](#), NBC New York, June 2020

### **Honors and Awards**

Science Excellence Award, Scarsdale High School, 2021

Finalist, National Merit, 2021

2nd in Westchester-Rockland Junior Science & Humanities Symposium for Computer Science

18th in Nation for Lincoln-Douglas Debate, National Debate Coaches Association, 2021

### **Relevant Coursework**

#### **Columbia University**

COMS 3203: Discrete Mathematics (Summer 2020)

COMS 3261: Computer Science Theory (Summer 2020)

E 2000: Multivariable Calculus (Fall 2020)

COMS 3251: Linear Algebra (Spring 2021)

#### **Princeton University**

COS 226: Algorithms and Data Structures (Fall 2021)

COS 217: Introduction to Programming Systems (Fall 2021)

MAT 203: Advanced Vector Calculus (Fall 2021)

COS 240: Reasoning About Computation (Spring 2022)

MAT 204: Advanced Linear Algebra with Applications (Spring 2022)

COS 316: Principles of Computer System Design (Fall 2022)

ORF 309: Probability and Stochastic Systems (Fall 2022)

PSY 255: Cognitive Psychology (Fall 2022)

COS484: Natural Language Processing (Spring 2023)

ORF307: Optimization (Spring 2023)