

Preston Fu

🌐 prestonfu.com

✉ prestonmfu@gmail.com

🐙 prestonfu

📄 preston-fu

Education Saratoga High School

GPA: 4.54/4.00

2022 SAT: 1590, ACT: 36, National AP Scholar

Relevant Coursework: Multivariable Calculus, Linear Algebra, Differential Equations, Data Structures, Graph Theory, Real Analysis

Certifications: Algorithms Specialization (Greedy Algorithms, Graph Search, Dynamic Programming, NP-Completeness), Deep Learning Specialization (Improving Deep Neural Networks, Structuring ML Projects, Convolutional Neural Networks, Sequence Models), Machine Learning, Game Theory

Independent Study: Algebraic Number Theory, Abstract Algebra, Enumerative Combinatorics

Activities & Societies: Math Club President, Engineering Club President, Superintendent Advisory Board, Saratoga Falcon newspaper Opinion Editor, Varsity Tennis Player

Experience Co-founder, Program Coordinator · Everaise Academy

2020–now

- 501(c)(3) non-profit school enabling free access to education for aspiring scientists.
- Recruited and led 50+ staff to teach 1500+ high school students from 40+ countries.
- Raised \$15k in sponsorships.
- Edited and published 3 textbooks: *Math Competitions 1*, *Physics Mechanics*, *Astronomy*.
- Directed web and curriculum development, competitions, speaker events, logistics, finance.

Research Intern · Boston University RISE

🔗 Poster · Abstract · Talk (0:22:14)

2021

- Developed locomotion and food collection environments for fast prototyping and performance measurement of reinforcement learning algorithms.
- Reduced dimensionality of robotic model's action space through principal component analysis on virtual actuators.
- Worked under Principal Investigator and Professor Yannis Paschalidis of the Neuro-Autonomy Research Initiative in Systems Engineering Lab.

Junior Counselor · Ross Mathematics Program

2019–2020

- Mentored students in Algebraic Number Theory.
- Teaching assistant for advanced courses in Analytic Number Theory, Topology, Equidistribution.

Math Curriculum Developer · AlphaStar Academy

2019

- Employed in the Math Development Team to write challenging problems for middle and high school students.

Books *Math Beyond the Classroom*, Oct 2020.

🔗 Amazon Paperback

An overview of topics in mathematics: complex numbers, principle of inclusion-exclusion, power of a point, modular arithmetic, and more.

Raised funds for complimentary need-based copies read by middle and high school students and teachers nationally; featured by Minnesota State MATHCOUNTS.

Projects Gaussian Mechanism as Protection from Sensitive Input Memorization

🔗 Paper · Github

2022

An investigation of the quantitative and qualitative properties of differential privacy in real-world usage. A case study in protecting PIN numbers from perplexity-based attacks on an LSTM model via Gaussian noise sampling.

Lifting Properties and Classification of Covering Spaces

🔗 Paper

2021


Covering maps, path- and homotopy-lifting, relationship to fundamental group, universal cover, connection to the Galois correspondence. Student author at Stanford University Math Camp, Program II in Algebraic Topology.

Feed

2021

2-D game and 3-D augmented reality simulator for increased awareness of political bias and polarization via automatic social media feed generation. Developer at Cronkite Summer Journalism Institute.

What Learning Looks Like

 globalstudentsquare.org

- 2020 Allowing students from across the world (10+ countries, 5 continents) to share experiences and perspectives amid the COVID-19 pandemic. Student author and front-end developer at [Newsroom By the Bay](#). Featured by [Chalkbeat](#).

Matrix Lie Groups and the Lie group–Lie algebra correspondence

 Paper

- 2020 Matrix exponentiation, tangent spaces, Lie bracket, Baker–Campbell–Hausdorff formula. Student author at [Euler Circle](#), Abstract Algebra.

Emojify

- 2020 Sentiment analysis model to debias a sentence and associate it with an emoji using word embeddings, Word2Vec, negative sampling, and GloVe word vectors.

SARS-CoV-2 Lineage Evaluation

 Github

- 2020 Predicts the origin regions of SARS-CoV-2 lineages based on their genomes. Achieves accuracy of 95.2% using L1 normalization on logistic regression.

Headline

- 2020 Gamified news source that incentivizes COVID-19-related education through team trivia and cash prizes, awarding users for staying up-to-date on scientific facts. UI/UX designer at [USC Viterbi Innovation Bootcamp](#).

3-adic Identities on $\sum_{i=0}^{n-1} \binom{2i}{i}$

 Presentation Notes

- 2019 Alternate proofs of results originally published in American Math Monthly via Hensel's lemma and multivariable calculus. Talk at [Euler Circle](#), p -adic Analysis.

Skills

Languages

Python, Java, C++, C, JavaScript, HTML+CSS

Technologies

PyTorch, TensorFlow/Keras, React, NumPy, Pandas, Matplotlib/Seaborn, Scikit-learn

Leadership

Head Coach, Liaison, MATHCOUNTS Lead Coordinator • Toga Junior Math Club

- 2018–now
- Created comprehensive 3-year rotating curriculum. Led 15 high school volunteers to teach weekly classes to middle school students.
 - Organized club events, contest participation. Facilitated communication between administrators, volunteers, parents, and students.
 - Organized testing logistics, proctoring, and grading for South Santa Clara Valley MATHCOUNTS Chapter (12 local middle schools).

President • Boys Team Charity, Saratoga Chapter

- 2017–now
- Organized guest speaker and charity events for a volunteer chapter of 130+ members.
 - Set up a computer system and math problem database for low-income K-5 students at Sunday Friends Community center. Designed STEM projects and led math and science activities.

Awards

USA Junior Math Olympiad

USA Physics Olympiad

USA Computing Olympiad, Gold Division

Canadian Open Mathematics Challenge

American Regions Mathematics League

Physics Bowl

US Math Competition Association

Tests of Engineering Aptitude, Math, Science

California Math Council Certificate Award

2020 Top 80 Nationally

2021 Honorable Mention, Top 150 Nationally

2018

2021 Honorable Mention, Top 8 Internationally

2020–2021 Top 30 Nationally • Team 1st

2021 Team 2nd Nationally, Division I

2020 Team 4th Nationally, Premier Division

2019–2020 National Qualifier

2021