

Jonathan Liu

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EDUCATION

Bachelor of Arts in Computer Science, Math, University of California, Berkeley

August 2016 – May 2020

3.82 GPA, High Distinction in General Scholarship, Honors in Mathematics.

RESEARCH

CS1 Reviewer App with Dr. Kristin Stephens-Martinez

September 2020 – Present

Created a feature to automatically generate quizzes catered to each student's unique strengths and weaknesses. Currently working on modifying Bayesian Knowledge Tracing model to improve assessment of student mastery, and analyzing quiz outcomes to optimize quiz difficulty and topic relevance.

Modular Construction of Symmetric Knots with Dr. Carlo Séquin

August 2018 – Present

Developed an optimization algorithm for assembling mathematical knots from joint-like components that attach to one another at discrete angles. Algorithm and visualization tools are written in Rust, supplemented by data analysis done in Python.

See <https://github.com/SelectricSimian/knot-optimization>.

Global Extensions to Lovász Local Lemma with Dr. Prasad Raghavendra

May 2019 – September 2019

Investigated global extensions of Lovász Local Lemma and the Moser-Tardos Algorithm, answering questions about the existence of solutions to low-degree k -SAT problems with certain weak global properties and how our understanding of Algorithmic Lovász Local Lemma can be improved to find them.

CONFERENCE PAPERS

C. H. Séquin, W. Brandon, J. Liu. "Modular Construction of Symmetrical Knots." SMIFASE 2019.

LEADERSHIP

President, Undergraduate Theoretical Computer Science

August 2018 – May 2020

Organizes and leads meetings for the club Undergraduate Theoretical CS (UGTCS) at Berkeley. The club hosts reading groups where students interested in theory can study interesting research-related topics and get advice from professors at Berkeley. Interesting recent topics included Theoretician's Toolkit and Algorithmic Game Theory. See <https://ugtcs.berkeley.edu/>.

WORK

Curriculum Intern, Art of Problem Solving, Inc.

May 2018 – August 2018

Worked to develop various aspects of math curricula for students from 4th to 12th grade. Responsibilities included lesson planning, activity creation, teaching, problem writing, and close reviews of coworkers' work. Analyzed relevant course data to refine and improve material as well.

TEACHING

Instructor and Forum Moderator, Art of Problem Solving, Inc.

May 2018 – Present

Teaches classes of 20–50 students through an online text-based classroom, and monitors student forums for all Art of Problem Solving online classes. These classes are in Math and Computer Science, and range in difficulty from Prealgebra to Calculus.

UGSI – Math W53, UC Berkeley

June 2019 – August 2019

Taught one section (35 students) of Math W53 (Multivariable Calculus) through an online course format. Maintained constant stream of communication with the students and monitored student progress to ensure that students were not falling behind, especially given that the course was condensed from 18 weeks to 8 weeks long.

UGSI – Math 1B, UC Berkeley

August 2018 – December 2018

Taught two sections (50 students) of Math 1B (Calculus 2). Responsibilities included 6 hours of instruction per week as well as lesson planning, worksheet creation, and grading. Also handled administrative work including gradebook management, forum monitoring, and online grading. Received an average rating of 6.7/7 from students.

SELECTED TALKS

“Prophet Inequality.” Algorithmic Game Theory Reading Group — 10/8/19.

“Pseudorandom Generators via Random Walks.” Spectral Graph Theory Reading Group — 11/7/19

“Pseudorandomness.” Theorist’s Toolkit Reading Group — 4/29/19

“The Dimension Argument.” Theorist’s Toolkit Reading Group — 2/4/19

COURSEWORK

Computer Science

EECS 126 - Probability and Random Processes

CS 170 - Efficient Algorithms and Intractable Problems

CS 270 - Graduate Combinatorial Algorithms and Data Structures

CS 276 - Graduate Cryptography

CS 294-153 - Graduate Probabilistically Checkable and Interactive Proofs

Math

Math H104 - Honors Introduction to Real Analysis

Math 110 - Linear Algebra

Math 113 - Abstract Algebra

Math 115 - Number Theory

Math 135 - Set Theory

Math 172 - Combinatorics

Math 185 - Complex Analysis

Math 224A - Mathematical Methods for the Physical Sciences

Math 249 - Algebraic Combinatorics

Math 375 - Teaching Workshop