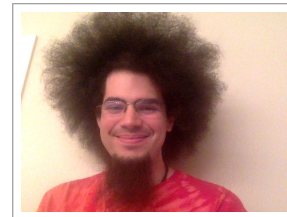


# Jalex Stark

## Curriculum Vitae

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🌐 [www.jalexstark.com](http://www.jalexstark.com)



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### Education

2013–2017 **B.Sc. Mathematics**, *California Institute of Technology*, Pasadena, GPA: 3.3/4.3.

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### Work Experience

- Summer 2016 **Mellon Mays Undergraduate Researcher**, *Caltech*.  
Under Dr. Martino Lupini, studied noncommutative graphs and connections to finite model theory, zero-error quantum information theory, and quantum complexity theory.
- Fall 2016 **Teaching Assistant CS/Ph 120, Quantum Cryptography**, *Caltech*.  
Under Professors Thomas Vidick and Stephanie Wehner (TU Delft), designed and implemented EdX course materials, moderated EdX forums. Consulted research papers to author original problem sets. With graduate TAs, graded Caltech problem sets and held weekly office hours.
- Spring 2016 **Teaching Assistant for CS 101, Special Topics: Modern Cryptography**, *Caltech*.  
Under Thomas Vidick, reviewed and graded biweekly problem sets, held weekly office hours.
- Spring 2015 **Teaching Assistant for CS 115, Programming in Haskell**, *Caltech*.  
Under Instructor Mike Vanier, graded weekly problem sets and held weekly office hours.
- Summer 2015 **Teaching Assistant for Ma0, Introduction to Proofs**, *Caltech*.  
Graded online submissions for problem sets. Recruited and trained the 2016 TA team.
- Summer 2016 **Counselor**, *Bridge to Enter Advanced Mathematics*.  
Taught three weeks of proof-based mathematics to underserved New York City seventh graders.
- Summer 2014 **Junior Counselor**, *Canada/USA Mathcamp*.
- Summer 2015 (See Selected Talks.) With other undergrads, ran logistics of five-week camp. Sat on mentor hiring and student admissions committees, contributed to the qualifying exam.
- Aug 2014–  
Apr 2017 **MATHCOUNTS Math Club Director**, *Walter Reed Middle School*.  
Taught after school once per week, hired other Caltech undergrads to expand program.
- Apr–Sep 2015 **Tutor**, *Beyond Curriculum*.  
Taught standard material from high school classes to high school students.

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### Mathematical Meetings Attended

Feb 2017 **QIP**, *Seattle*.

- Nov 2016 **Invited Participant, Focused Research Group**, *Banff International Research Station*.  
One week of research in collaboration with Dr. Martino Lupini (Caltech), Professors Matthew Kennedy (Waterloo), Marcin Sabok (McGill), Martín Argerami (Regina). Introduced the probabilistic method for noncommutative graphs and investigated the QMA-completeness of the noncommutative graph homomorphism problem. Results in preparation.
- Sep 2016 **Participant, Combinatorics and Operators in Quantum Information**, *Belfast*.  
Five days of tutorials by Vern Paulsen, Andreas Winter, Monique Laurent.
- Aug 2016 **Participant, Logical Structures in Computation**, *Simons Institute, Berkeley*.  
Five days of lectures by Phokion Kolaitis, Samson Abramsky, Prakash Panangaden, Anuj Dawar.

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## Service

- Apr 2015 – **Academic Coordinator**, *Caltech Undergraduate Math Club*.  
Apr 2017 Recruited 15 different undergrad speakers over the course of my tenure. For each speaker, heard a practice talk and gave constructive feedback before their presentation to Caltech undergrads.
- Fall 2015, **Director**, *Caltech Harvey Mudd Math Competition*.  
Fall 2016 As Director, fully organized a one-day math competition for high school students from the west coast of the US and from China. Managed problem-writing and edited problems.

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## Selected Talks Given

- Nov 2016 **Computational Complexity of Quantum Source-Channel Coding**, *Caltech Ma 10*.  
Oct 2016 **Welzl's Theorem on Graph Homomorphisms**, *Caltech undergraduate math club*.  
Oct 2016 **One-Shot Zero-Error Channel Capacity**, *Caltech undergraduate math club*.  
Mar 2016 **Quantum Computation**, *Caltech undergraduate math club*.  
Mar 2016 **Combinatorial game theory**, *Splash! at Claremont Colleges*.  
Feb 2016 **NP and Fagin's Theorem**, *Caltech finite model theory reading group*.  
Jan 2016 **Color Refinement and Fractional Isomorphism**, *Caltech undergraduate math club*.  
Jul 2015 **Ladner's Theorem**, *Canada/USA Mathcamp, day 2 of 4-day mini-course*.  
Jul 2015 **Ordinal Arithmetic**, *Canada/USA Mathcamp, 3-day mini-course*.  
Sep 2014 **Combinatorial game theory**, *Caltech undergraduate math club*.  
Jul 2014 **Surreal numbers**, *Canada/USA Mathcamp*.

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## Selected Classes Taken

CS 101	<b>Special Topics: Randomness Extractors</b>	<i>near-optimal explicit constructions</i>
CS 151	<b>Complexity Theory</b>	<i>derandomization, the polynomial hierarchy, circuit lower bounds</i>
Ph 219abc	<b>Quantum Computation</b>	<i>quantum circuits, error correcting codes, Shannon theory</i>
Ma 116abc	<b>Mathematical Logic and Set Theory</b>	<i>large cardinal axioms and models of set theory</i>
Ma 121b	<b>Combinatorial Analysis</b>	<i>existence proofs via the probabilistic method</i>
Ma 191	<b>Selected Topics: Ramsey Theory</b>	<i>nonstandard analysis and topological dynamics</i>
Ma 191	<b>Selected Topics: Continuous Logic</b>	<i>model theory for metric structures with applications to <math>C^*</math>-algebras, sofic groups</i>

- Ma 144 **Probability** *concentration of measure, theory of martingales, ergodic processes*
- Ma 191 **Selected Topics: Geometrical Paradoxes** *amenability of groups, Banach–Tarski*
- CS 150 **Probability and Algorithms** *analysis of probabilistic algorithms*
- CS 177 **Discrete Differential Geometry** *theory of differential forms on discrete graphs with C++ implementations*

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## Campus Leadership

- 2016–2017 **Student chair**, *Mathematics Student Faculty Committee*.  
 academic year Organized professors and students to devise/implement changes to the undergrad math option.
- Apr 2015 – **Secretary**, *Board of Control*.
- Mar 2016 Oversaw half of all academic dishonesty cases among Caltech undergraduates. Wrote official recommendations to the Dean's Office, according to guidelines of the Office of General Counsel.
- Feb 2015 – **President**, *Dabney House*.
- Feb 2016 Primary representative to administration for on-campus living group of 120 undergrads.