

LIZA J. JACOBY

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EDUCATION

University of California, Berkeley

Expected Ph.D. in Mathematics

Berkeley, CA

August 2022 – Present

- Advisor: Dr. Ian Agol
- Studying discrete geometry and low-dimensional topology
- Graduate Student Equity & Inclusion Coordinator to the Department of Mathematics

Williams College

B.A. Mathematics and Philosophy

Williamstown, MA

September 2018 – June 2022

- Cumulative GPA: 3.83; Mathematics GPA: 3.87
- Awarded Highest Honors in Mathematics
- Dean's List: Fall 2018, Spring 2019, Fall 2020, Spring 2021, Fall 2021

AWARDS & HONORS

Williams College – *Olga R. Beaver Prize in Mathematics*

May 2022

Awarded to the graduating student who has made the greatest contributions to the mathematics and statistics community

National Science Foundation Graduate Research Fellowship

April 2022

Three years of funding during graduate studies, awarded based on potential for success in research and academia

Williams College – *Erastus C. Benedict, Class of 1821, Prize in Mathematics, Second Prize*

May 2020

Awarded to outstanding second-year students in the mathematics and statistics department

PUBLICATIONS

- [5] S. Gao, L. Jacoby, W. Johnson, J. Leng, R. Li, C. Silva, and Y. Wu. On finite symbolic rank words and subshifts. Submitted. [arXiv:2010.05165](https://arxiv.org/abs/2010.05165).
- [4] M. Echavarría, M. Everett, S. Huang, L. Jacoby, R. Morrison, and B. Weber. On the scramble number of graphs. *Discrete Applied Mathematics*, Vol. 310 (2022), pp. 43–59. DOI: [10.1016/j.dam.2021.12.009](https://doi.org/10.1016/j.dam.2021.12.009).
- [3] C. Adams, C. Edgar, P. Hollander, and L. Jacoby. The Rest of the Tilings of the Sphere by Regular Polygons. Resubmitted after positive referee reports. [arXiv:2101.10743](https://arxiv.org/abs/2101.10743).
- [2] M. Echavarría, M. Everett, S. Huang, L. Jacoby, R. Morrison, A. K. Tewari, R. Vlad, and B. Weber. Moduli dimensions of lattice polygons. *J Algebr Comb* (2021). DOI: [10.1007/s10801-021-01062-6](https://doi.org/10.1007/s10801-021-01062-6).
- [1] L. Jacoby, R. Morrison, and B. Weber. Prism graphs in tropical plane curves. *Involve*, Vol. 14 (2021), No. 3, pp. 495–510. DOI: [10.2140/involve.2021.14.495](https://doi.org/10.2140/involve.2021.14.495).

RESEARCH ENDEAVORS

UC Berkeley Graduate Student Research Position

Advised by Dr. David E. Nadler

Berkeley, CA

June 2023 – August 2023

- Reconstructing the format and rewriting the materials for the UC Berkeley Preliminary Assessment
- Crafting hundreds of questions with comprehensive solutions in linear algebra, abstract algebra, real analysis, complex analysis, and some miscellaneous topics
- Creating a detailed syllabus and study guide and restructuring the preparatory workshop

Senior Honors Thesis

Advised by Dr. Cesar E. Silva

Williamstown, MA

September 2021 – May 2022

- Investigates symbolic subshifts corresponding to cutting-and-stacking geometric dynamical systems, particularly sequences and systems beyond rank-one, including infinite rank
- Explores the underlying discrete geometric properties of one-dimensional periodic sequences; new discrete geometric proof methods generalize one-dimensional results to higher dimensions
- Draws upon ideas from tiling theory to define a method of encoding the patterns which arise in infinite aperiodic symbolic sequences; we discover classes of sequences related by their encodings and relate our new type of construction to current ideas from the literature

Williams College Department of Mathematics & Statistics

Research Assistant to Dr. Colin C. Adams

Williamstown, MA

June 2021 – August 2021

- Summer research project aiming to extend previous results in tiling theory from January 2021 (completing the classification of all non-edge-to-edge tilings of the 2-sphere by regular polygons)
- Defined terminology for tilings on and the geometry of the n -tuple branched cover of the 2-sphere with two branch points
- Discovered new families of tilings of the n -tuple branched cover of the 2-sphere by regular polygons; discovered three new families of (non-uniform) star polyhedra in attempting to prove the existence of particular families of tilings, chipping away at a project instantiated by Kepler in 1619

Independent Study in Mathematics

Studying and researching under Dr. John D. Wiltshire-Gordon

Williamstown, MA

February 2021 – June 2021

- Embarked upon a new pedagogical approach to singular cohomology; studied explicit formulas for singular cochains on simplicial complexes (e.g., representatives of the cohomology classes of the orientation class of a sphere, the local cohomology of a point in \mathbb{R}^n , and the local cohomology of the diagonal in X^2)
- Discovered new formulas for several famous singular cochains
- Created a series of short lecture videos introducing ideas from singular cohomology, accessible to students with knowledge of calculus and linear algebra

Williams College SMALL REU

Research Assistant to Dr. Ralph E. Morrison

Williamstown, MA

June 2020 – August 2020

- Worked in a group of six students in the areas of tropical geometry and chip-firing games; two papers published, a third accepted for publication
- In the area of embedded tropical geometry, focused mainly on classifying non-tropically-planar graphs, moduli dimensions of lattice polygons; in chip-firing, made use of the new graph invariant of *scramble number*

Williams College Department of Mathematics & Statistics

Extracurricular research project in tiling theory under Dr. Colin C. Adams

Williamstown, MA

March 2020 – January 2021

- Project in tiling theory; joint work with P. Hollander and C. Edgar arising from a question we brought to office hours with Dr. Adams
- Answered the long-standing question (dating back to 350 BCE) of providing a complete classification of the tilings of the 2-sphere by regular polygons; provided an exhaustive list of non-edge-to-edge tilings, introducing 33 new families of tilings

LEADERSHIP & TEACHING EXPERIENCE

UC Berkeley Mathematics Equity & Inclusion Committee

Graduate Student Equity & Inclusion Coordinator

Berkeley, CA

beginning August 2023

- Graduate Student Researcher position under Dr. David Nadler
- Responsibilities include but are not limited to: planning diversity, equity, and inclusion efforts in the Department of Mathematics; running workshops and programming to bolster community amongst persons presenting historically excluded identities; reimagining and reconstructing methods of evaluation for graduate students so as to reduce harm for the most vulnerable members of our community

UC Berkeley Mathematics & Physical Sciences Scholars Program

Graduate student mentor

Berkeley, CA

February 2023 – present

- Holding office hours and setting up regular advising meetings with three undergraduate mathematics majors

- Mentorship encapsulates helping mentees navigate the mathematics major and other aspects of undergraduate education, as well as helping to ensure access to the university's and department's resources

UC Berkeley Directed Reading Program

Berkeley, CA

Graduate student advisor

February 2023 – present

- Meeting weekly with an undergraduate mentee to teach, discuss, and work on problems in introductory differential topology, the geometrization theorem, and the classification of 2- and 3-manifolds
- Responsibilities include answering questions, coming up with lesson plans and exercises, and serving as a mentor for an aspiring mathematician

UC Berkeley Mathematics Equity & Inclusion Committee

Berkeley, CA

Committee member

October 2022 – present

- Committee meets biweekly to address and discuss intra-departmental matters of diversity, equity, inclusion, discrimination, accessibility, and all other related affairs
- Responsibilities may consist of canvassing faculty, post-docs, and graduate students, forming external committees to evaluate and vote on harmful departmental practices, and brainstorming new paths towards harm reduction for graduate students from historically excluded groups in mathematics

UC Berkeley Mathematics Graduate Student Association

Berkeley, CA

Elected officer of the board

October 2022 – present

- Organizing community events such as weekly teas and department-wide parties, as well as handling department merchandise
- Liaising with faculty, staff, and other academic personnel on administrative tasks, advertisement of programs, and departmental organization; includes the organization of the office draw
- Running intra-departmental elections for certain important positions, such as the committee to choose the next department chair

Pacelli Zepka Mathematics Camp

Williamstown, MA

Teaching assistant under Dr. Allison Pacelli

July 2022

- Served as a mentor and tutor for high school students learning number theory
- Worked with two other teaching assistants to run active learning problem sessions for the students

Association for Women in Mathematics

Williamstown, MA

President of the Williams College student chapter

September 2020 – May 2022

- Organizing social events such as dinners, card game tournaments, and movie nights to create a community within the larger mathematics and statistics community for students from historically marginalized groups in the fields
- Hosting research talks (Williams professors, professors from other institutions, graduate students, and undergraduates), alumnae panels, discussions on diversity, equity, and inclusion, and other events which bolster academics and research; events often targeted at underclass students
- Advertising conferences and other academic/research opportunities; encouraging membership to the national organization and participation in talks, workshops, and other opportunities

Student Mathematics & Statistics Advisory Board

Williamstown, MA

President

September 2021 – May 2022

- Liaising directly with faculty on the needs of the student body, addressing in particular diversity, equity, and inclusion
- Organizing events for the entire department, including academic advising and research events for the mathematics and statistics students
- Sitting in on decisions for new hirings; meeting with the visiting committee evaluating the department on structure, funding for student organizations, discrimination, etc.

Teaching Assistant to the Department of Mathematics & Statistics

Williamstown, MA

Student instructor in mathematics

February 2020 – May 2022

- MATH 250 - Linear Algebra (Spring 2020, Fall 2021); MATH 474 - Tropical Geometry (Spring 2021); MATH 303 - Dynamics, p -Adics, & Measure (Fall 2021); MATH 321 - Knot Theory (Spring 2022)
- Hosting discussion sessions of three to six students to discuss the course material under my guidance, holding help sessions for students in the course, providing insight on projects, and giving feedback on problem sets

Mathematics & Statistics Mentoring Program

Peer mentor

Williamstown, MA

September 2021 – May 2022

- Academic advising, assistance in communication with professors, and forming a support network for three underclass students

Williams College Athletics

NCAA Division III Varsity Athlete in Cross Country and Track & Field

Williamstown, MA

September 2018 – May 2022

- Competition in the 400m, 600m, 800m, mile, and relays for the track & field team; competition in the 5k for the cross country team

TALKS, LECTURES, AND PRESENTATIONS

[11] “Beilinson-Bernstein Correspondence: Building Representations of $SL(2, \mathbb{C})$ via Twisted Vector Fields.”

Talk: Geometric Representation Theory Seminar, UC Berkeley, October 2022.

[10] “Non-edge-to-edge Tilings, Branched Covers, & Star Polyhedra.”

Talk: 3-Manifold Seminar, UC Berkeley, September 2022.

[9] “Symbolic Sequences Beyond Rank-One & Super Secret Discrete Geometry.”

Talk: Senior Honors Thesis Defense, Williams College, May 2022.

[8] “Non-Edge-to-Edge Tilings, Branched Covers, & Star Polyhedra.”

Talk: Math For All Conference hosted by Tulane University, February 2022.

[7] “Tiling Branched Covers of the 2-Sphere.”

Talk: MAA MathFest, August 2021.

[6] “A New Approach to Singular Cohomology.”

Series: Short, accessible lecture videos on singular cohomology, February – June 2021.

[5] “The Rest of the Tilings of the Sphere by Regular Polygons.”

Talk: Math For All Conference hosted by Tulane University, March 2021.

[4] “The Rest of the Tilings of the Sphere by Regular Polygons.”

Poster presentation: Joint Mathematics Meetings, January 2021.

[3] “Introduction to Spherical Geometry and Tilings of the 2-sphere.”

Talk: University of Wisconsin-La Crosse Math & Stats Club, November 2020.

[2] “Moduli Dimensions of Lattice Polygons.”

Talk: Young Mathematicians Conference, August 2020.

[1] “Dimensions of Moduli Spaces.”

Talk: University of Connecticut Northeast REU Conference, July 2020.

PROFESSIONAL MEMBERSHIPS

American Mathematical Society

Association for Women in Mathematics

Mathematical Association of America

ADDITIONAL INFORMATION

Programming Languages & Skills: Java, R, Mathematica

Languages: Proficiency in Japanese, written and spoken

Interests: Running, rock climbing, cycling, snow sports, classical guitar