

# Adam Boocher

## Positions

- July 2016 - **University of Utah.**  
present Don Tucker Postdoctoral Research Assistant Professor
- July 2015 - **University of Utah.**  
July 2016 Research Assistant Professor
- Jan 2014 - **University of Edinburgh.**  
July 2015 Postdoctoral Researcher

## Interests

Commutative Algebra, Computational Algebraic Geometry, Combinatorics

## Education

- Ph.D. **University of California, Berkeley, Fall 2013.**  
Mathematics Advisor: David Eisenbud  
Thesis: Superflatness
- B.S. Honors **University of Notre Dame, Spring 2008.**  
Mathematics Summa Cum Laude  
Phi Beta Kappa

## Awards, Grants, and Fellowships

- Don H. Tucker Postdoctoral Fellowship (2016)
- Professor of the Year Award (U. of Utah Greek Fraternity and Sorority Councils 2016)
- NSF Conference Grant for Macaulay2 Meeting in Salt Lake City (PI) (2015)
- Distinguished Graduate Student Instructor Award (2012)
- NSF Graduate Research Fellowship (2008)
- Barry M. Goldwater Scholarship (2006)
- G.E. Prize for Honors Mathematics Majors (2008)
- Kolettis Award in Mathematics (2008)
- Poster Prize at Joint Math Meetings (2008)
- Robert Balles Mathematics Prize (2007)
- Aumann Prize in Mathematics (2005)

## Publications

- [13]. **Lower Bounds for Betti Numbers of Monomial Ideals.** *Submitted.* (with J. Seiner)
- [12]. **Koszul Algebras Defined by Three Relations.** *to appear in a Springer INdAM Volume in honor of Winfried Bruns.* (with H. Hassanzadeh and S. Iyengar)
- [11]. **The Software Package SpectralSequences.** *Submitted.* (with N. Grieve and E. Grifo)
- [10]. **On the Growth of Deviations.** *Proc. Amer. Math. Soc.* 144 (2016), no. 12 (with A. D'Ali, E. Grifo, J. Montaña, A. Sammartano)
- [9]. **Edge Ideals and DG Algebra Resolutions.** *Le Matematiche.* 70 (2015), no. 1, 215-238 (with A. D'Ali, E. Grifo, J. Montaña, A. Sammartano)
- [8]. **The Closure of a Linear Space in a Product of Lines.** *J. Alg. Comb* 43 (1), 199-235, 2016. (with F. Ardila)
- [7]. **Robust Graph Ideals.** *Ann. Comb.* 19 (4), 641-660, 2015 (with B. Brown, T. Duff, L. Lyman, T. Murayama, A. Nesky, K. Schaefer)
- [6]. **Robust Toric Ideals.** *J. Symbolic Comput.* 68, 2015, part 1, 254-264. (with E. Robeva)

- [5]. **Free Resolutions and Sparse Determinantal Ideals.** *Math. Res. Lett.* 19 (2012), no. 4, pp. 805-821.
- [4]. **Dimensions of Formal Fibers of Height One Prime Ideals.** *Comm. Algebra* 38 (2010), no. 1, pp. 233-253. (with M. Daub, S. Loepp)
- [3]. **Formal Fibers of Unique Factorization Domains.** *Canad. J. Math* 62 (2010), no. 4, pp. 721-736. (with M. Daub, R. Johnson, H. Lindo, S. Loepp, P. Woodard)
- [2]. **Sampling Lissajous and Fourier Knots.** *Experiment. Math.* 18 (2009), no. 4, pp. 481-497. (with J. Daigle, J. Hoste, W. Zheng)
- [1]. **On generators of bounded ratios of minors for totally positive matrices.** *Linear Algebra Appl.* 428 (2008) pp. 1664-1684 (with B. Froehle)

## Invited Talks

- Structures on Free Resolutions Conference*, Lubbock (Fall 2017)
- UC Berkeley Commutative Algebra Seminar (Fall 2017)
- University of Edinburgh EDGE Seminar (Fall 2017)
- Park City Mathematics Institute - Program for High School Students (Summer 2017)
- Westminster College Senior Seminar (Spring 2017)
- Colorado State FRAGMENT Seminar (Spring 2017)
- Colorado State SPLINTER Seminar (Spring 2017)
- University of Wisconsin, Madison (Fall 2016)
- Midwest Commutative Algebra and Algebraic Geometry Conference*, Notre Dame (Spring 2016)
- Algebra and Geometry Seminar, Caltech (Spring 2016)
- Westminster College Guest Lecture (Spring 2016)
- University of Utah Algebraic Geometry Seminar (Fall 2015)
- AMS Sectional Meeting* California State University, Fullerton (Fall 2015)
- University of Notre Dame Algebra Seminar (Fall 2015)
- AMS Sectional Meeting* Loyola University, Chicago (Fall 2015)
- University of Utah Commutative Algebra Seminar (Fall 2015)
- British Indian Mathematical Seminar*; Chennai, India (Winter 2015)
- Queen Mary University, London (Fall 2014)
- MOCCA Conference* Levico Terme, Italy (Summer 2014)
- University of Warwick Algebraic Geometry Seminar (Spring 2014)
- University of Edinburgh EDGE Seminar (Winter 2014)
- University of Kentucky Algebra Seminar (Winter 2014)
- Joint Math Meetings* Baltimore (Winter 2014)
- AMS Sectional Meeting* University of California Riverside (Fall 2013)
- San Francisco State University (Fall 2013)
- UC Berkeley Commutative Algebra Seminar (Fall 2013)
- SUMR Reunion Conference honoring Frank Connolly*, University of Notre Dame (Spring 2013)
- Joint Math Meeting*, San Diego (Winter 2013)
- UC Berkeley Commutative Algebra Seminar (Fall 2012)
- Syzygies* Conference, Cornell University, NY (Fall 2012)
- MSRI Commutative Algebra Seminar (Fall 2012)
- University of Michigan Commutative Algebra Seminar (Fall 2012)
- University of Notre Dame Algebraic Geometry Seminar (Fall 2012)
- UC Berkeley Computational Algebraic Geometry Seminar (Spring 2012)
- UC Berkeley Commutative Algebra Seminar (Fall 2011)
- MONICA Conference Castro-Urdiales, Spain (Summer 2011)
- Purdue U. Comm. Algebra Seminar (Fall 2007)

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## Teaching Experience

### Instructor

Math 4800 Introduction to Undergraduate Research (Representation Theory) (Fall 2017 Utah)  
Math 3210 Foundations of Real Analysis (Spring 2017 Utah)  
Undergraduate Hyperbolic Geometry Seminar (Spring 2017 Utah)  
Math 4030 Foundations of Abstract Algebra (Fall 2016 Utah)  
Undergraduate Knot Theory Seminar (Fall 2016 Utah)  
Math 2270 Linear Algebra (Spring 2016 Utah)  
Freshman Group Theory Seminar (Spring 2016 Utah)  
Math 1260 AP Calculus II (Honors Freshman Calculus) (Fall 2015 Utah)  
Freshman Topology Seminar (Fall 2015 Utah)  
Math 3 Introduction to Number Theory (Fall 2014 Edinburgh)  
Math 53 Multivariable Calculus (Summer 2010 Berkeley)

### Teaching Assistant (at UC Berkeley)

Math 16A Calculus for Life Sciences (Fall 2013)  
Math 55 Discrete Math (Fall 2011)  
Math 1A and 1B Calculus (2009-2010)

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## Undergraduate Research Supervised

Organizer **University of Utah Summer REUs**

**Sarah Melancon (U. Utah)**

Topics in Commutative Algebra - ongoing

**Jimmy Seiner (U. Michigan)**

Paper "Lower Bounds for Betti Numbers of Monomial Ideals" submitted for publication

Organizer **Berkeley RTG Summer Undergraduate Research Program (Summer 2013)**

Students Advised: Bryan Brown, Tim Duff, Laura Lyman, Takumi Murayama, Amy Nesky, Karl Schaefer

All students presented at joint conference with Stanford's summer program

Research paper "Robust Graph Ideals" published in Annals of Combinatorics.

Tim Duff and Karl Schaefer won a "Best Poster Prize" at the 2014 Joint Meeting

Organizer **REU Organizer: Algebraic Geometry Group at Notre Dame REU (Summer 2008)**

Students Advised: Josh Mollner, Kaitlyn Moran, Emma Whitten

Josh and Emma presented at MathFest in 2008.

Organizer **Undergraduate Reading Course Instructor (Spring 2007)**

Designed algebraic geometry course material accessible to sophomore math majors

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## Outreach and Other Professional Activities

Co-Facilitator of the U. Utah TA Training Program for incoming graduate students (Summer 2017)

Teaching Assistant for MSRI Summer Graduate School - Okinawa Japan (Summer 2017)

Organizer - Summer workshop for High School Math Teachers, U. of Utah (Summer 2017)

PI and Co-organizer of the *Macaulay2 Development Workshop*, U. of Utah (Spring 2016)

Co-organizer of AMS Special Session on Commutative Algebra, U. of Utah (Spring 2016)

Co-organizer of GLEN Seminar, U. of Glasgow (Spring 2015)

Co-organizer of the UK Commutative Algebra Seminar (2014 - 2015)

Author/Contributor to `SpectralSequences` package for *Macaulay2*

UC Berkeley Math Department Faculty Hiring Subcommittee Graduate Student Member (Spring 2011)

Co-organizer of the Berkeley Graduate Student Mentoring Program (2009-2011)

Math Graduate Student Association Officer (2009 - 2012)

Graduate Student Representative to the University Committee for Course Instruction (COCI) (2008-2009)

Organizer of first year student algebraic geometry seminar - UC Berkeley (2008 - 2009)

Teaching assistant for Notre Dame research experience for high school teachers (Summer 2008)  
Co-organizer of the conference: Undergraduate Work in Mathematics, Notre Dame, (September 2007)  
Referee: Algebra and Number Theory, J. Algebra, Proc. AMS, J. Comb. Theory Ser. A, J. Comm. Algebra, J. Pure and Applied Algebra, J. Symbolic Computation, Michigan Math. J., Springer INdAM.  
Proofreader, Greek Celestial Mechanics Manuscript (2006-2007)

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## Selected Conferences Attended

(★ denotes conferences where I presented)

- ★ *Structures on Free Resolutions Conference*, Lubbock (Fall 2017)
- Bay Area Discrete Math Day*, Moraga, CA (Fall 2017)
- Commutative Algebra Plus (CA+)*, Minneapolis (Fall 2017)
- Stillman's Conjecture and other Progress on Free Resolutions* (Summer 2017)
- ★ *Summer Graduate School - Commutative Algebra and Related Topics*; Okinawa, Japan (Summer 2017)
- A View Towards Algebraic Geometry, in honor of David Eisenbud's birthday*; Martha's Vineyard (Spring 2017)
- Homological Conjectures*; Chicago (Fall 2016)
- RUME with a View*; Norman (Fall 2016)
- Commutative Algebra and Its Interactions with Algebraic Geometry (in honor of Craig Huneke's Birthday)*, Michigan (Summer 2016)
- ★ *Midwest Commutative Algebra and Algebraic Geometry Conference*; Notre Dame (Spring 2016)
- Joint Math Meetings*; Seattle (Winter 2016)
- ★ *AMS Sectional Meeting*; Loyola University, Chicago (Fall 2015)
- ★ *AMS Sectional Meeting*; California State University, Fullerton (Fall 2015)
- AMS Algebraic Geometry Summer Institute*; Salt Lake City, Utah (Summer 2015)
- Szygies and Applications in honor of Frank Schreyer*; Saarbrücken, Germany (Summer 2015)
- MRC - Math Research Communities*; Commutative Algebra. Snowbird, Utah (Summer 2015)
- GLEN*; Glasgow, Scotland (Spring 2015)
- Let's Matroid*; Neuchâtel, Switzerland (Spring 2015)
- ★ *British Indian Mathematical Seminar*; Chennai, India (Winter 2015)
- Commutative Algebra in UK Seminar*; Sheffield, UK (Fall 2015)
- BrAG*; Warwick, UK (Fall 2014)
- ★ *MOCCA*; Levico Terme, Italy (Summer 2014)
- Algebraic Geometry in Seattle*; Washington (Summer 2014)
- ★ *PRAGMATIC*; Catania, (Summer 2014)
- ★ *Joint Math Meetings*; Baltimore, (Winter 2014)
- ★ *Western Algebraic Geometry Seminar (WAGS)*; San Diego (Fall 2013)
- ★ *AMS Sectional Meeting*; University of California, Riverside, (Fall 2013)
- MEGA*; Goethe-Universität, Frankfurt, Germany (Summer 2013)
- ★ *SUMR Reunion Conference honoring Frank Connolly*; University of Notre Dame, (Spring 2013)
- ★ *Joint Math Meetings*; San Diego (Winter 2013)
- ★ *Szygies Conference*; Cornell University (Fall 2012)
- ★ *Western Algebraic Geometry Seminar (WAGS)*; Univ. Utah (Fall 2012)
- ★ *MSRI Commutative Algebra Year*; Berkeley, CA (2012-2013)
- ★ *Macaulay2 Workshop*; Wake Forest Univ. (Summer 2012)
- ★ *MRC - Math Research Communities*; Geometry and Representation Theory Related to Geometric Complexity and Other Variants of P v. NP. Snowbird, Utah. (Summer 2012)
- ★ *Pan-American Advanced Studies Institute 2012*; Commutative Algebra, Algebraic Geometry, Representation Theory, and Physics; Guanajuato, Mexico (Summer 2012)
- Western Algebraic Geometry Seminar (WAGS)*; Univ. Washington (Spring 2012)
- AMS Section Meeting*; Lawrence, KS (Spring 2012)
- ★ *Western Algebraic Geometry Seminar (WAGS)*; Fort Collins, CO (Fall 2011)

★ *MONICA*; Castro-Urdiales Spain, (Summer 2011)

*Midwest Commutative Algebra and Geometry Conference*; Purdue Univ. (Spring 2010)

*Western Algebraic Geometry Seminar (WAGS)*; Stanford, CA (Spring 2011)

*Local Rings*; Trieste, Italy (Summer 2010)

*MAGIC 2010*; Notre Dame, IN (Spring 2010)

*PASI: Commutative Algebra and its Connections to Geometry*; Olinda, Brazil (Summer 2009)

★ *Algebraic Geometry Semester at MSRI*; Berkeley, CA (Spring 2009)

★ *Joint Math Meetings*; San Diego, CA (January 2008)

★ *Joint Math Meetings*; New Orleans, LA (January, 2007)