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ACADEMIC DEGREES

University of Illinois, Urbana-Champaign, Ph.D., Mathematics, May 2000.

Wheaton College, B.S., Mathematics, Economics, Aug. 1995.

ACADEMIC POSITIONS

California Polytechnic State University, Professor, Sept. 2013–present (Associate Chair Winter 2017–present); Associate Professor, Sept. 2008–Aug. 2013; Assistant Professor, July 2003–Aug. 2008.

University of Michigan, Post Doctoral Assistant Professor, Aug. 2000–June 2003.

University of Illinois, Urbana-Champaign, Teaching Assistant, Aug. 1995–May 2000.

COURSES

Calculus I, Math 141 – Fall 03/04/06/07/09/15.

Calculus II, Math 142 – Fall 07/08/12/13/14, Winter 04/05/07/08/11/14/16, Spring 07/08.

Calculus III, Math 143 – Fall 05/16/17, Winter 09/10/13/15/17, Spring 08/11.

Calculus for the Life Sciences, Math 161 – Winter 12.

Orientation to the Math Major, Math 2 – Fall 11/12/13/14/15/16/17/, Spring 13/14/15/16/17.

Linear Algebra I, Math 206 – Fall 15.

Calculus IV, Math 241 – Fall 03, Winter 06/11, Spring 05/06.

Linear Analysis I, Math 244 – Fall 11, Spring 09.

Methods of Proof, Math 248 – Fall 09/12/13/17, Winter 09/10/15.

Linear Algebra II, Math 306 – Fall 04, Winter 08/14.

Combinatorics, Math 336 – Winter 13/16/17.

Number Theory, Math 341 – Fall 05/08, Spring 10/17.

Linear Algebra III, Math 406 – Spring 05.

Analysis I, Math 412 – Fall 06.

Analysis II, Math 413 – Winter 07.

Analysis III, Math 414 – Spring 07.

Game Theory, Math 437 – Spring 04.

Senior Seminar, Math 459 – Fall 11, Spring 06/09/10/11.

Abstract Algebra I, Math 481 – Fall 14, Winter 04/12/18.

Abstract Algebra II, Math 482 – Spring 04/12.

Field Theory, Math 560 – Spring 12/14/16.

READING COURSES SUPERVISED

Spring 2017 – Algebra I
- Supervised Danielle Brown, an undergraduate student, reading *Introduction to Abstract Algebra, 4th ed.*, by Nicholson.

Fall 2013 – Math 500; Extension of our Summer REU
- Supervised Cal Poly graduate student Mike Ion as he explored ideas related to the 2013 summer REU in which he took part.

Winter 2012 – Commutative Algebra
- Supervised Trevor Jones, an undergraduate student, reading *Commutative Algebra*, by Atiyah, MacDonald.

Spring 2011 – Set Theory
- Supervised Nathan Carrol, an undergraduate student, in a course on set theory.

Fall 2009 – Homological Algebra
- Supervised Sam Saiki, an undergraduate student, reading *An Introduction to Homological Algebra*, by Rotman.

Spring 2009 – Number Theory
- Supervised Sam Saiki, an undergraduate student, reading *Elementary Number Theory*, by Burton.

Spring 2006 – Advanced Number Theory
- Supervised Joshua Hill, a graduate student, reading the first part of *A Classical Introduction to Modern Number Theory*, by Ireland and Rosen.

OTHER TEACHING EXPERIENCE

College Algebra – University of Illinois (U of I), small group learning format, Spring 1998, Summer 1997.

Elementary Linear Algebra with Applications – U of I, ran review sections and graded exams, Fall 1997.
Linear Algebra – University of Michigan (U of M), Fall 2002.

Business Calculus – U of I, lectured to over 200 students and supervised 6 graduate TAs, Spring 1999. Taught small lecture sections in Fall 1995/1996, Spring 1996.

Calculus with *Mathematica* – U of I, calculus taught using the software package *Mathematica*, Spring 2000.

Calculus I – U of I, small lecture section format, Summer 1998; small group learning format, Spring 1996.

Calculus II – U of M, small group learning format, Fall 2000, Spring 2001.

Applied Modern Algebra – U of M, Spring 2001.

Commutative Algebra I – U of M, graduate, Fall 2001.

Commutative Algebra II – U of M, graduate, Spring 2002.

COURSES COORDINATED

Abstract Algebra I, Math 481 – Fall 2004–present.

Abstract Algebra II, Math 482 – Fall 2004–present.

Game Theory, Math 437 – Fall 2004–Spring 2007.

ORAL EXAM COMMITTEES

Oral Exam Committee for David Kato – Spring 2016/Fall 2016.

Oral Exam Committee for Caleb Miller – Spring 2016.

Oral Exam Committee for Shelby Burnett – Spring 2016.

Oral Exam Committee for Chad Eckman – Spring 2016.

Oral Exam Committee for Jason Elwood – Spring 2016.

Oral Exam Committee for Jon Lindgren – Spring 2016.

Oral Exam Committee for Michael Schultz – Spring 2015.

Oral Exam Committee for Katie Muckle – Spring 2015.

Oral Exam Committee for Mike Ion – Spring 2015.

Oral Exam Committee for Blanca Lopez – Spring 2014.

Oral Exam Committee for Michael Campbell – Spring 2014.

Oral Exam Committee for Mollee Huisinga – Spring 2014.

Oral Exam Committee for Jenny Aguayo – Spring 2014.

Oral Exam Committee for James Hall – Spring 2014.

Oral Exam Committee for Timothy McCaughey – Spring 2014.

Oral Exam Committee for Steven Tartakovsky – Spring 2014.

Oral Exam Committee for Clint Florka – Spring 2014.

Oral Exam Committee for Casey Kelleher – Spring 2012.

Oral Exam Committee for Erin Kelly – Spring 2012.

Oral Exam Committee for Suzanne Lavertu – Spring 2012.

Oral Exam Committee for Richard Neufeld – Spring 2012.

Oral Exam Committee for Staci Pearson – Spring 2012.

Oral Exam Committee for Kendell Rosales – Spring 2012.

Oral Exam Committee for Clint Hahlbeck – Spring 2007.

SENIOR PROJECTS SUPERVISED

Matthew Varble – *Classifying Modules* completed Spring 2016. Considering which quotients of the polynomial ring can be classified via lex ideals.

Amelia Newman – *Implications of Dickson's Conjecture* completed Spring 2015. Explores the implications of Dickson's conjecture for the Prime k-tuples conjecture, Polignac's Conjecture, the Twin Primes conjecture, etc.

Jason Elwood – *Stanley's Conjecture* completed Spring 2013. Introducing the background necessary to understand the statement of Stanley's Conjecture on Cohen-Macaulay simplicial complexes.

Chad Duna – *Introduction to Stanley-Reisner Theory* completed Spring 2013. Exploring the dictionary between squarefree monomial ideals and simplicial complexes.

Nathan Carrol – Set Theory, incomplete, Spring 2012.

Ben Woodford – *Do Dogs Know Game Theory?* completed Spring 2012. Exploring fetch and other games using mathematics.

Matthew Roy – Turing Machines, incomplete, Spring 2011.

Josh Levine – *Quaternions: Finding Their Place in the Field of Aircraft Attitude Determination*, completed Winter 2011. Studying the use of quaternions to determine the attitude of a craft after a series of rotations.

Jerry Miszewski – *Perfect Graphs and the Strong Perfect Graph Theorem*, completed Winter 2010. Studying the proof of the Strong Perfect Graph Theorem.

Mathew Boutte – *Input Output Economics*, completed Spring 2008. Examining the linear algebra of Leontief's Input Output Analysis.

Nicholas Read and John Stenger – *Investigating Primality Testing*, completed Spring 2007. Coding several primality tests in Maple and attempting algorithm improvements.

Tim Emerick – *Investigations of the Possible Angle Constructions Produced by a Straightedge and Compass*, completed and submitted to the Library Spring 2007. Considering which angles are quintesectable using a ruler and compass.

Madeline Arcellana – *How Many $n \times n$ Matrices of Rank k and Weight j are there over F_p?* completed Spring 2007. Computing the probability that a given matrices has a certain rank or weight.

David Hampton – *N-card War with Choice*, completed Spring 2007. Identifying the game theoretic strategies in a variation on the card game war.

Ian Wilson – *Using the Quadratic Reciprocity Law to Solve Quadratic Congruence Equations*, completed and submitted to the Library Winter 2007. Developing an algorithm to solve equations modulo p.

Nathan Cramton – *Matrix Calculator*, completed Fall 2006. Coding the algorithms of linear algebra, and applying this code to various common Math 306 and 406 exercises.

Tim Northup – *Game Theory in Cards: A Look at War and its Variations*, completed Spring 2005. A game theoretic analysis of modifications of the card game war.

Melissa Cook – *Game Theory in Business*, completed Spring 2005. A study of the game theoretic implications of competition between El Corral Bookstore and Aida's University Book Exchange.

Ben Abramovitz – *Game Theory and Kuhn Poker*, completed Spring 2005. Explorations of optimal strategies in a simple variation of Poker.

Siu Leung Fong – *Buchsbaum Eisenbud Horrocks Conjecture*, completed Spring 2004. A report on our summer 2003 REU project.

Melissa Kraus – *Some Results on the Buchsbaum-Eisenbud-Horrocks Conjecture*, completed and submitted to the Library Spring 2004. A report on our summer 2003 REU project and its extensions. Melissa presented a poster at both the COSAM Student Research Conference and the AMS Joint Meetings in 2004. At the joint meetings she was awarded a prize for her work.

UNDERGRADUATE RESEARCH

Cal Poly Mathematics Department Summer Research Program, 2013 – supervised three Cal Poly undergraduate students, Jason Elwood, Caleb Miller, and Brian Jones, (all three have since graduated from Poly with Masters degrees) and two Cal Poly graduate students, Michael Campbell and Mike Ion (both now graduated) on a summer research project during the summer 2013. We studied Stanley's conjecture that Cohen-Macaulay simplicial complexes are partitionable. While this is (now) known to be false in general, we found an ad hoc proof that the conjecture holds in dimension 2 for up to 7 points.

Cal Poly Mathematics Department Summer Research Program, 2009 – supervised two Cal Poly undergraduate students (Sam Saiki and Mike Mogull—both have since graduated from Poly with Masters degrees) and one Cal Poly graduate student (David Jansson) on a summer research project during the summer 2009. We studied the poset tree of graded Betti numbers for a fixed Hilbert function. In particular, we identified an infinite family of pairs of Hilbert functions and degree to height functions for which the associated subtrees of graded Betti numbers corresponding to squarefree monomial ideals fail to have unique maximal elements (thus disallowing one possible extension of the Lex Plus Powers conjecture to squarefree monomial ideals). We may prepare a manuscript detailing this work for submission.

Intel Science Talent Search Competition, Winter 2007 – supervised a 2007 Intel Science Talent Search Competition entry for Sam Saiki a local high school student who took classes at Cal Poly (he has since

graduated from Poly with his Masters degree). Sam was a semi-finalist in the competition (one of 300 out of 1705 entries, with a $1000 prize).

Seimens-Westinghouse Research Competition, Summer 2006 – supervised a Seimens-Westinghouse research competition entry for Sam Saiki (the same project as described above for the Intel Science Talent Search Competition). Sam was a semi-finalist in the competition.

NSF REU Summer Research Program at Cal Poly, 2005 – supervised one student from the University of Chicago, one student from Pacific Union College, and one Cal Poly student on a summer research project during Summer 2005. We studied the existence or non-existence of unique minimal sets of graded Betti numbers of all ideals exhibiting a given Hilbert function using square-free monomial ideals. Our results have been published in Communications in Algebra. The Cal Poly student also presented a poster at the 2006 COSAM Student Research Conference.

NSF REU Summer Research Program at Cal Poly, 2004 – supervised two students from the University of Chicago, and one Cal Poly student on a summer research project during Summer 2004. We studied minimal graded Betti numbers of square free monomial ideals and some of the topological and combinatorial properties of their underlying simplicial complexes.

Cal Poly Mathematics Department Summer Research Program, 2003 – supervised two Cal Poly students on a summer research project during Summer 2003. One student presented our results at the Joint Mathematics Meetings in Phoenix in Jan. 2004 and won a prize in the poster competition. She also presented her poster at the COSAM Student Research Conference in 2004.

REU supervisor, Spring and Fall 2002 – supervised undergraduate research projects at the University of Michigan in Spring 2002 and Fall 2002.

COSAM STUDENT RESEARCH CONFERENCE POSTERS SUPERVISED

Caleb Miller, Michael Campbell, Brian Jones, Mike Ion, Spring 2014 – Caleb, Michael, Brian, and Mike presented a poster discussing our proof that Cohen Macaulay simplicial complexes in dimension 2 and up to 7 points are partitionable, which was the topic of our Cal Poly 2013 Summer REU.

Mike Mogull, Sam Saiki, Spring 2010 – Mike and Sam presented a poster discussing the existence of unique maximal elements on the poset trees of squarefree monomial ideals with given Hilbert and degree to height functions, which was the topic of our Cal Poly 2009 Summer REU.

Tim Emerick, Spring 2007 – Tim presented a poster discussing which angles are quintesectable using a ruler and a compass, which was the topic of his senior project.

Victor Meyerson, Spring 2006 – Victor presented a poster discussing graded Betti numbers of squarefree monomial ideals, which was the topic of his summer 2005 NSF REU.

Melissa Kraus, Spring 2004 – Melissa presented a poster discussing the Buchsbaum-Eisenbud-Horrocks conjecture, which was the topic of her senior project.

PUBLICATIONS

- *A Proof of Evans' Convexity Conjecture**, Communications in Algebra, **43** (2015), no. 8, 3275-3281.

  *[*The referee's report for this manuscript was received after I turned in my last WPAF, and required substantial revision. Thus roughly 40% of the work was done after my last file was submitted].*
- *Errata for Syzygies of semi-regular sequences*, (with Keith Pardue), Il. J. of Math., **56** (2012), no. 4, 1001-1003.
- *Syzygies of Semi-Regular Sequences*, (with Keith Pardue), Il. J. of Math., **53** (2009), no. 1, 349-364.
- *The Residuals of Lex Plus Powers Ideals and the Eisenbud-Green-Harris Conjecture*, (with Sindi Sabourin), Il. J. of Math., **52** (2008), no. 4, 1355-1384.

- *Lex-Plus-Powers ideals* (with Chris Francisco), Syzygies and Hilbert functions, 113-144, Lect. Notes Pure Appl. Math., 254, Chapman & Hall/CRC, Boca Raton, FL, 2007.
- *Minimal Betti Numbers*, (with undergraduates Chris Dodd, Andrew Marks, and Victor Meyerson), Comm. Alg., **35** (2007), no. 3, 759-772 – this paper is the result of our work during the summer 2005 NSF REU at Cal Poly.
- *Lower Bounds for Betti Numbers of Special Extensions*, (with Melvin Hochster), J. Pure Appl. Algebra, **201** (2005), no. 1-3, 328-339 (in honor of Wolmer Vasconcelos).
- *A Study of the Lex Plus Powers Conjecture*, J. Pure and Applied Algebra, **186** (2004), no. 2, 169-183.
- *Monomial Ideals and N-Lists*, Il. J. of Math., **48** (2004), no. 2, 391-414.
- *Possible Resolutions for a Given Hilbert Function*, (with E. Graham Evans), Comm. Algebra **30** (2002), no. 2, 897-906.
- *Smallest Graded Betti Numbers*, Journal of Algebra, **244** (2001), no. 1, 236-259.

CONFERENCE PRESENTATIONS

AMS Sectional Meeting: Special Session on Commutative Algebra, Salt Lake City, Utah, April 2016.

Joint Mathematics Meetings: AMS Special Session on Commutative Algebra and Algebraic Geometry, San Diego, California, January 2013.

AMS Sectional Meeting: Special Session on Commutative Algebra and its Interaction with Algebraic Geometry and Combinatorics, Riverside, California, November 2013.

AMS Sectional Meeting: Special Session on Combinatorial Commutative Algebra, Lawrence, Kansas, April 2012.

AMS Sectional Meeting: Special Session on Combinatorial Algebra, Lexington, Kentucky, March 2010, (based on works with Cal Poly students).

AMS Sectional Meeting: Special Section on Graded Resolutions, Boca Raton, Florida, October 2009 (based on works with Cal Poly students).

Macaulay 2 Conference, Ithaca, New York, March 2008.

AMS Sectional Meeting: Special Session on Combinatorial Algebraic Geometry, Notre Dame, Indiana, April 2006.

AMS Sectional Meeting: Special Session on Resolutions, Eugene, Oregon, November 2005.

AMS Sectional Meeting: Special Session on Algebraic Geometry and Commutative Algebra, Nashville, Tennessee, Oct. 2004.

Route 81 Conference in honor of Graham Evans, and Workshop on Resolutions (for young researchers), Cornell University, Oct. 2004.

AMS Sectional Meeting: Special Session on Syzygies and Hilbert Functions, Tallahassee, Florida, March 2004.

Joint Summer Research Conference on Commutative Algebra: Presentations by Young Researchers, Snowbird Summer Resort, Utah, July 2003.

Route 81 Conference on Commutative Algebra and Algebraic Geometry, Queens University, Kingston, Ontario, Canada, Oct. 2002.

Joint Mathematics Meetings, San Diego, California, Jan. 2002.

Route 81 Conference on Commutative Algebra and Algebraic Geometry, University at Albany, SUNY, Nov. 2001.

Route 81 Conference on Commutative Algebra and Algebraic Geometry, Cornell University, Oct. 2000.

AMS Sectional Meeting, Special Session on Syzygies, Lowell, Massachusetts, April 2000.

Route 81 Conference on Commutative Algebra and Algebraic Geometry, Syracuse University, Oct. 1999.

OTHER PRESENTATIONS

Mathematics Department Colloquium, Cal Poly, May 2006.

Math 202, Guest Panelist, Cal Poly, Spring 2006.

NSF REU summer presentation, Cal Poly, June 2004.

NSF REU summer presentation, Cal Poly, June 2003.

Algebraic Geometry Seminar, University of Notre Dame, April 2002.

Commutative Algebra Seminar, University of Illinois, Urbana-Champaign, Feb. 2002.

Undergraduate Math Club, University of Michigan. Jan. 2002.

Student Commutative Algebra/Algebraic Geometry Seminar, University of Michigan, Nov. 2001.

Student Commutative Algebra/Algebraic Geometry Seminar, University of Michigan, April 2001.

Commutative Algebra Seminar, University of Michigan, Sept. 2000.

Commutative Algebra Seminar, University of Illinois at Urbana-Champaign, Feb. 1999.

Commutative Algebra Seminar, University of Illinois at Urbana-Champaign, April 1998.

OTHER CONFERENCES ATTENDED

Syzygies and Hilbert Functions, Oct. 2006, Banff International Research Station for Mathematical Innovation and Discovery, Banff, Alberta, Canada.

Midwest Algebra, Geometry and their Interactions Conference: MAGIC 05, Oct. 2005, University of Notre Dame, South Bend, Indiana.

2004 AMS Joint Meetings, Phoenix, Arizona.
– Melissa Kraus was awarded a prize for a poster presented at this meeting based on our summer 2003 REU project.

CBMS Lecture Series: Solving systems of Polynomial Equations, Texas A&M University, College Station, Texas, May 2002.

AMS Sectional Meeting, Special Session in Commutative Algebra, University of Michigan, Ann Arbor, Michigan, March 2002.

CoCoA VII Conference, Queens University, Kingston, Ontario, Canada, July 2001.

Joint Mathematics Meetings, Washington, D.C, Jan. 2000.

AMS Sectional Meeting, University of Illinois, Urbana-Champaign, March 1999.

Route 81 Conference on Commutative Algebra and Algebraic Geometry, Queen's University, Kingston, Ontario, Oct. 1998.

Summer Program for Graduate Students of MSRI Sponsoring Institutions: Algorithmic Algebra and Geometry. Berkeley, California, July 1998.

Midwest Topology Seminar, University of Illinois, Urbana-Champaign, March 1997.

GRANTS, FELLOWSHIPS, AND SCHOLARSHIPS

California State Faculty Support Grant, Winter 2007.

California State Faculty Support Grant, Winter 2006.

NSF VIGRE postdoctoral fellowship, May 2003–June 2003, Sept. 2001–May 2002.

Rackham Faculty Fellowship, May 2002–June 2002.

Department of Education GAANN Fellowship, Jan. 1997–May 1997, Sept. 1998–Dec. 1998, Sept. 1999–Dec. 1999.

Wheaton College Class Scholarship, Aug. 1992–May 1993, Aug. 1993–May 1994, Aug. 1994–May 1995.

CONFERENCES AND SEMINARS ORGANIZED

Seminar Co-organizer, Algebra Seminar, Cal Poly, Fall 2006–Spring 2008, Fall 2009–Winter 2012, Fall 2013, Fall 2015, Fall 2017–present.

Conference Co-organizer, AMS Sectional Meeting, Special Session on Hilbert Functions and Free Resolutions, (with Chris Francisco and Susan Cooper), Oct. 2008.

Conference Co-organizer, AMS Sectional Meeting, Special Session on Resolutions and Hilbert Functions, (with Sean Sather-Wagstaff), April 2006.

SERVICE TO THE DEPARTMENT

Associate Chair of the Mathematics Department: Winter 2018–present.

Chair of the Screening Committee: Fall 2014–Winter 2015.

Mathematics Department Undergraduate Coordinator: Fall 2011–present.

Member of Curriculum Committee: Fall 2011–present.

Member of Screening Committee: Fall 2011–Winter 2012.

Member of Math Dept. Recruitment and Development Plan Committee: Winter/Spring 2009.

Member of Graduate Committee: Fall 2008–Spring 2012.

Help with department outreach: WOW week new student orientation, open house, Mustang Family Weekend, etc.: regularly, 2011–present.

Member of PRC: Fall 2008–present.

Member of Graduate Committee: Fall 2007–Spring 2008.

Prospective Student Calling: Spring 2006. Volunteered to contact 10 students admitted to the math major for Fall 2007.

Member of Algebra Exam Committee: Jan. 2004–Fall 2010, Winter 2012–Winter 2013. Served as chair from Aug. 2004–May 2005, Aug 2006–Jan 2007.

Member of Screening Committee: Fall 2004–Winter 2005.

SERVICE TO THE COLLEGE

Member of the College Personnel Document Committee: Fall 2011–Spring 2012.

Muir Hall Honors banquet: faculty attendee, Winter 2009.

College of Science and Mathematics Missions and Values Committee: Spring 2005.

Attended Fall Conference: various times 2004–present.

Attended Spring commencement: various times 2003–present.

SERVICE TO THE UNIVERSITY

Club Adviser: Coffee Connoisseurs – Winter 2016–Winter 2017.
Club Adviser: Apoc Entrepreneurial Club – Fall 2011–Fall 2013.
Club Adviser: Poly Game Creation – Spring 2005–Spring 2007.

SERVICE TO THE PROFESSION

Grant Referee for The National Security Agency.
Referee for Illinois Journal of Mathematics.
Referee for Journal of Algebra.
Referee for Journal of Pure and Applied Algebra.
Reviewer for Math Reviews.
Referee for Communications in Algebra.
Referee for Advances in Mathematics.
Referee for Canadian Journal of Mathematics.
Referee for Proceedings of the American Mathematical Society.
Thesis Committee Member for Haggai Elitzur, Spring 2003.
Oral Preliminary Committee Member for Hai Long Dao, Spring 2003.
Oral Preliminary Committee Member for Geoffrey Dietz, Fall 2002.
VIGRE Teaching Apprentice Supervisor, Spring 2001.

SOCIETIES

Member of the American Mathematical Society.
Member of the Association of Christians in the Mathematical Sciences.