

Michael Tait

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- Research** I am interested in using algebraic, geometric, probabilistic, and spectral methods to study problems in extremal graph theory, combinatorial number theory, and finite geometry.
- Employment** **NSF Postdoctoral Fellow** at Carnegie Mellon University 2017
Mentor: Po-Shen Loh
- Education** **Ph.D. Mathematics** University of California, San Diego 2016
Advisor: Jacques Verstraëte
Thesis: *Connections between graph theory, additive combinatorics, and finite incidence geometry*
- M.S. Mathematics** University of Delaware 2011
Advisor: Sebastian Cioabă
Thesis: *The Alon-Saks-Seymour and Rank-Coloring Conjectures*
- B.S. Mathematics and Economics** University of Delaware 2010
- Papers published or to appear** More Counterexamples to the Alon-Saks-Seymour Conjecture and the Rank-Coloring Conjecture. *The Electronic Journal of Combinatorics*, P26, 1–9, (2011).
With Sebastian Cioabă
- Variations on a theme of Graham and Pollak, *Discrete Mathematics*, Volume 313, Issue 5, 665 – 676, (2013).
With Sebastian Cioabă
- Sidon sets and graphs without 4-cycles. *Journal of Combinatorics*, Volume 5, Issue 2, 155 –165 (2014).
With Craig Timmons.
- On Coupon Colorings of Graphs, *Discrete Applied Mathematics* 193, 94 – 101, (2015).
With Bob Chen, Jeong Han Kim, and Jacques Verstraëte.
- On the chromatic number of the Erdős-Rényi orthogonal polarity graph. *The Electronic Journal of Combinatorics*, P2.21, 1–19, (2015).
With Xing Peng and Craig Timmons.
- Small dense subgraphs of polarity graphs and the extremal number for the 4-cycle. *The Australasian Journal of Combinatorics*, Volume 63 (1), 107–114, (2015).
With Craig Timmons.
- On sets of integers with restrictions on their products, *European Journal of Combinatorics* 51, 268 – 274 (2016).
With Jacques Verstraëte.
- On the distance spectra of graphs. *Linear Algebra and its Applications* 497, 66–87,

(2016).
(11 authors).

Orthogonal Polarity graphs and Sidon sets. To appear in *Journal of Graph Theory*.
With Craig Timmons.

Increasing paths in edge-ordered graphs: the hypercube and random graphs, *The Electronic Journal of Combinatorics*, 23.2, P2.15
With Jessica De Silva, Theodore Molla, Florian Pfender, and Troy Retter.

Independent sets in polarity graphs. To appear in *Siam Journal on Discrete Mathematics*.
With Craig Timmons

**Manuscripts
submitted**

A Szemerédi-Trotter type theorem, sum-product estimates in finite quasifields, and related results.
With Thang Pham, Craig Timmons, and Le Anh Vinh

Proof of a conjecture of Graham and Lovász concerning unimodality of coefficients of the distance characteristic polynomial of a tree
With 7 authors.

Spectral upper bounds for the k -independence number.
Submitted with Aida Abiad and Sebastian Cioabă.

On a problem of Neumann.

Characterizing graphs of maximum principal ratio.
With Josh Tobin.

Three conjectures in spectral extremal graph theory.
With Josh Tobin.

Theses

The Alon-Saks-Seymour and Rank-Coloring Conjectures, M.Sc. Thesis, University of Delaware (2011).

Connections between graph theory, additive combinatorics, and finite incidence geometry, Ph.D. Thesis, University of California San Diego (2016).

**Teaching
Experience**

Associate Instructor, University of California, San Diego, Summer 2015
Instructor of record: Gave lectures, homework, and exams for Calculus II (Math 10B). Facilitated learning through technology via a YouTube channel highlighting problem solving techniques.

Teaching Assistant, University of California, San Diego, 2011 – present.
Led discussion section and graded exams for Statistical Methods (Math 183), Discrete Mathematics & Graph Theory (Math 154A), Introduction to Analysis I (Math 142A), Fundamentals of Math Teaching and Learning I and II (Math 121A and 121B), Calculus for Science & Engineering I–III (Math 20A, Math 20B, Math 20C), Calculus I (Math 10 A)

GULP Mentor, University of California, San Diego, Winter 2015.
Held weekly research meetings with 4 undergraduate researchers for the Graduate-

Undergraduate Learning Program.

Adjunct Instructor, University of San Diego, 2012.

Instructor of record: Gave lectures, homework, and exams for Calculus I (Math 150)

Adjunct Instructor, San Diego Mesa College, 2012.

Instructor of record: Gave lectures, homework, and exams for College Algebra (Math 116)

Teaching Assistant, University of Delaware, 2010 – 2011.

Led discussion sections and graded exams for Analytic Geometry and Calculus A and B (Math 241, Math 242). Ran a weekly Maple lab for the second course.

Awards

NSF Postdoctoral Fellowship 2016 – 2019.

ARCS (Achievement Rewards for College Scientists) Scholarship: These scholarships reward excellence in research. Selection is based primarily on the exceptional promise of the nominee to make a significant contribution to the advancement of science, and to the material and intellectual welfare of all people, 2014-2015

David A. Sharp Academic Excellence Award for Men's Track/Cross-Country, 2011

Clarks Award: Presented only when a senior majoring in mathematics has unusual ability in the area, 2010

Stephen J. Wolfe Memorial Scholarship: Awarded to a student entering the senior year majoring in mathematics who has demonstrated both love and talent for the subject, 2009

ESPN The Magazine Academic All-American Nominee, 2009

Talks

Final Defense, University of California, San Diego, April 2016.

Defense: *Connections between graph theory, additive combinatorics, and finite incidence geometry.*

UVM Mathematics Colloquium, University of Vermont, February 2016.

Colloquium: *Connections between graph theory and combinatorial number theory.*

Joint Math Meetings, AMS Special Session on Research from the 2014 and 2015 Rocky Mountain-Great Plains Graduate Workshop in Combinatorics, I. Seattle, WA, January 2016.

Special Session Talk: *Increasing paths in edge-ordered graphs.*

Discrete Seminar, University of Colorado Denver, October 2015.

Seminar Talk: *Some results on polarity graphs.*

Discrete Math Seminar, University of Delaware, September 2015.

Seminar Talk: *Graphs coming from projective planes.*

Combinatorics and its Applications, Miami University of Ohio, September 2015.

Contributed Talk: *Sum-product estimates in finite quasifields.*

Algorithms, Combinatorics and Optimization Seminar, Carnegie Mellon University,

September 2015.

Seminar Talk: *Some results on polarity graphs.*

Connections in Discrete Mathematics: A celebration of the work of Ron Graham, Simon Fraser University, June 2015.

Contributed Talk: *Polarity graphs with many edges.*

Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University Fort Collins, April 2015.

Seminar Talk: *Recent results on polarity graphs.*

Combinatorics Seminar, Emory University, November 2014.

Seminar Talk: *Distinct edge weights on graphs.*

Conference on Graph Theory, Matrix Theory and Interactions, Queen's University, June 2014.

Contributed Talk: *Coupon colorings of regular graphs.*

Modern Trends in Algebraic Graph Theory, Villanova University, PA, June 2014.

Contributed Talk: *Orthogonal polarity graphs and Sidon sets.*

Advancement to Candidacy, UC San Diego, May 2014.

Candidacy Talk: *Colorings of graphs and extremal combinatorics.*

Lake Arrowhead Combinatorics Reunion Conference, Lake Arrowhead, CA, June 2012.

Contributed Talk: *Generalizations of the Graham-Pollak Theorem*

Student Summer Combinatorics Seminar, University of Delaware, August 2011.

Seminar Talk: *On L -biclique coverings of K_n*

Master's Thesis Defense, University of Delaware, April 2011.

Defense: *The Alon-Saks-Seymour and Rank-Coloring Conjectures*

Hallenbeck Graduate Student Seminar, University of Delaware, March 2011.

Seminar Talk: *Decomposing the complete r -uniform Hypergraph*

Discrete Math Seminar, University of Delaware, September 2010.

Seminar Talk: *More counterexamples to the Alon-Saks-Seymour Conjecture*

Undergraduate Research Symposium, University of Delaware, April 2010.

Poster Presentation: *Line Arrangements in the Projective Plane*

Undergraduate Research Symposium, University of Delaware, August 2009.

Poster Presentation: *Line Arrangements in the Projective Plane*

Research Visits Carnegie Mellon University, Sept.-Oct. 2015
Host: Po-Shen Loh

UC Denver and University of Denver, Oct. 2015
Hosts: Florian Pfender and Paul Horn

Workshops and Conferences Networked Life: Celebrating the life and career of Fan Chung and Ron Graham

UC San Diego
January 30-31, 2016

Connections in Discrete Mathematics: A Celebration of the work of Ron Graham
Simon Fraser University
June 15–19, 2015: Travel grant from the conference

Rocky Mountain-Great Plains Graduate Research Workshop in Combinatorics
Iowa State University
June 1–12, 2015: Travel grant from workshop

AMS Sectional Meeting
University of Nevada Las Vegas
April 18–19, 2015

SP Coding and Information Theory School
University of Campinas
January 19–30, 2015: Travel grant from the Science Foundation of São Paulo

Atlanta Lecture Series in Combinatorics and Graph Theory
Emory University
November 1–2, 2014

Rocky Mountain-Great Plains Graduate Research Workshop in Combinatorics
University of Denver
July 27–August 9, 2014: Travel grant from workshop

Algebraic Combinatorics: A conference to celebrate the work of Chris Godsil
University of Waterloo
June 23–27, 2014: Travel grant from Fields Institute

Conference on Graph Theory, Matrix Theory and Interactions: A conference to celebrate the scholarship of David Gregory
Queen's University
June 20–21 2014

Modern Trends in Algebraic Graph Theory
Villanova University
June 2–5, 2014

Graduate Student Combinatorics Conference
University of Minnesota
April 19–21, 2013: Travel grant from organizers

AMS Joint Mathematics Meetings
San Diego, CA
January 9–12, 2013

Lake Arrowhead Combinatorics Reunion Conference
Lake Arrowhead, CA
June 10–14, 2012

Service

GULP Mentor: I was a mentor for the Graduate-Undergraduate Learning Program at UCSD. I supervised 4 undergraduate students while they explored finite affine

geometries and their connection to the card game SET. The undergraduates gave a presentation on their research project at the end of the quarter.

Co-organizer of the Food For Thought Seminar: I am an organizer for weekly seminars given by graduate students at UCSD. I obtained a grant from the university that funded the 2015 Spring quarter.

I have refereed for *Ars Combinatoria*, *Discrete Mathematics*, *Electronic Journal of Linear Algebra*, *European Journal of Combinatorics*, *Graphs and Combinatorics*, *Journal of Combinatorial Theory Series B*, *Journal of Combinatorics*, *Linear Algebra and its Applications*, *Linear and Multilinear Algebra*, and *SIAM Journal on Discrete Mathematics*.

I am a reviewer for Mathematical Reviews