

Matthew T. Stamps

Yale-NUS College, 12 College Avenue West, Singapore 138610
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Professional Experience

Assistant Professor of Science Yale-NUS College Singapore	2015 –
Research Fellow KTH Royal Institute of Technology Stockholm, Sweden	2013 – 2015
Postdoctoral Researcher Aalto University Helsinki, Finland	2012 – 2013
Explore Math Director University of California Davis, CA, USA	2009 – 2011

Visiting Appointments

Visiting Scientist Harvey Mudd College Claremont, CA, USA	Semester 2 2019
Visiting Scholar University of Washington Seattle, WA, USA	Semester 1 2018

Education

PhD in Mathematics University of California Davis, CA, USA <i>Advisor: Eric Babson – Dissertation: Topological Methods in Matroid Theory</i>	2007 – 2011
BSc in Mathematics Grand Valley State University Allendale, MI, USA <i>Advisor: David Austin – Honors: Magna Cum Laude, Niemeyer Award Recipient</i>	2003 – 2007

Research Interests

I am interested in algebraic, geometric, and topological methods in combinatorics and applied mathematics.

Publications

Linear algebraic techniques for spanning tree enumeration

American Mathematical Monthly, Vol. 127, No. 4 (2020), 297–307. (With S. Klee)

Linear algebraic techniques for weighted spanning tree enumeration

Linear Algebra and its Applications, Vol. 582 (2019), 391–402. (With S. Klee)

Computational geometric tools for quantitative comparison of locomotory behavior

Scientific Reports, Vol. 9, No. 16585 (2019). (With S. Go and A. Mathuru)

Face numbers of Engström representations of matroids

Discrete Mathematics, Vol. 343, No. 1 (2020), 111555. (With S. Klee)

Graded Betti numbers of cycle graphs and standard Young tableaux

Journal of Combinatorics, Vol. 9, No. 1 (2018), 1–7. (With S. Klee)

Betti diagrams from graphs

Algebra and Number Theory, Vol. 7, No. 7 (2013), 1725–1742. (With A. Engström)

Topological representations of matroid maps

Journal of Algebraic Combinatorics, Vol. 37, No. 2 (2013), 265–287.

An evolutionary method for the minimum toll booth problem: The methodology

Information and Management Sciences, Vol. 11, No. 2 (2008), 33–51. (With L. Bai, R. C. Harwood, and C. Kollmann)

A genetic algorithm for the minimum toll booth problem

Annual Proceedings of the Decision Science Institute (2006), 30411–30416. (With L. Bai, R. C. Harwood, and C. Kollmann)

Other Scholarly Writing

Starting earlier on lifelong learning

American Mathematical Society Blog “On Teaching and Learning Mathematics”, May 2020.

Preprints

Correlation and Simpson conversion in two-by-two-by-two contingency tables

Submitted, arXiv: 1809.04633, 15pp. (With S. Linusson)

Graded Expectations: Betti numbers and anti-lecture hall compositions of random threshold graphs

Submitted, arXiv: 1801.00029, 24pp. (With A. Engström and C. Go)

Eigenvalues of graph Laplacians via rank-one perturbations

Submitted, arXiv: 2008.01669, 8pp. (With S. Klee)

Spanning tree enumerators and forbidden induced subgraphs of nuclear graphs

In preparation, manuscript available upon request, 27pp. (With C. Go, Z. X. Khwa, and X. Luo)

Awards & Distinctions

Yale-NUS College Bridging Research Grant (With A. Mathuru)	May 2019
NUS CDTL Teaching Enhancement Grant (With M. Seo and J. Liu)	Oct 2017
Yale-NUS College Teaching Innovation Grant (With S. Amjad)	Jun 2016
NSF International Research Fellowship	Jul 2013
Magnus Ehrnrooth Foundation Travel Grant	Mar 2012
NSF VIGRE Graduate Fellowship	Aug 2010
UC Davis Yueh-Jing Lin Scholarship in Mathematics	Jun 2010
USDE GAANN Graduate Fellowship	Sep 2007
GVSU Glen A. Niemeyer Outstanding Undergraduate Student Award	Apr 2007
GVSU Award for Excellence	Aug 2003

Curriculum Development

I introduced, developed the content for, and was the first instructor of record (or member of the inaugural teaching team) for the following courses. The daggers indicate team taught courses.

Yale-NUS College

- Accelerated Calculus with Applications	Semester 2 2016
- Applied Calculus	Semester 1 2016
- Conceptual Calculus	Semester 1 2015
- Creative Problem Solving	Semester 2 2017
- Discrete Mathematics	Semester 2 2018
- Geometry & The Emergence of Perspective	Semester 2 2017
- Group Theory	Semester 1 2015
- Introduction to Modern Algebra	Semester 1 2017
- Mathematical, Computational & Statistical Sciences Capstone Seminar	Semester 2 2017
- Rings & Fields	Semester 2 2016
- Scientific Inquiry 2 [†]	Semester 1 2017

Aalto University

- Algebraic Topology and Applications	Semester 2 2013
- Representation and Invariant Theories of Finite Groups [†]	Semester 2 2012

Additional Teaching Experience

I was the instructor of record in charge of all aspects of the following regularly offered courses with previously prepared syllabi (by a departmental committee, a colleague, or myself).

Yale-NUS College

- Calculus Semester 1 | 2020
- Conceptual Calculus Semester 1 | 2016
- Discrete Mathematics Semester 2 | 2020
- Geometry & The Emergence of Perspective Semester 2 | 2018
- Group Theory Semester 1 | 2016
- Scientific Inquiry 2[†] Semester 1 | 2019

KTH Royal Institute of Technology

- Applied Combinatorics Semester 1 | 2014

University of California, Davis

- Combinatorics Quarter 4 | 2011
- Short Calculus III Quarter 1 | 2010
- Short Calculus III Quarter 4 | 2010

Undergraduate Thesis Supervision (Primary)

- Nini Chang** (co-supervised with Ajay Mathuru) Yale-NUS College | 2021
Thesis: Early detection of neurodegeneration via automated speech pattern analysis
- Zhong Xuan Khwa** Yale-NUS College | 2020
Thesis: Spanning tree enumeration for partially threshold graphs
- Xinyu Luo** Yale-NUS College | 2020
Thesis: Bounding the number of spanning trees in a bipartite graph
- Elaine Wijaya** Yale-NUS College | 2020
Thesis: From Bézier to Pixar: The mathematics of computer automated design
- Markus Le Roux** Yale-NUS College | 2019
Thesis: Introduction to persistent homology
- Swarnima Sircar** Yale-NUS College | 2019
Thesis: Automated redistricting
- Narayani Tulsian** Yale-NUS College | 2019
Thesis: Polynomial invariants in algebra, combinatorics and topology
- Gin Ong** Yale-NUS College | 2018
Thesis: Ramsey theory and machine learning
- Nur Qistina Abdul Wahid** Yale-NUS College | 2017
Thesis: Applications of contemporary algebra to coding theory
- Christian Go** Yale-NUS College | 2017
Thesis: Betti numbers of random threshold graphs

Undergraduate Thesis Supervision (Secondary)

- Lu Yi** (Primary Supervisor: Geoff Baker) Yale-NUS College | 2020
Thesis: Mathematical Anxiety: 19th Century Non-Euclidean Geometry as Modern Literature

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Independent Study Supervision

Swarnima Sircar Topic: The Geometry of Gerrymandering	Yale-NUS College 2017
Christian Go Topic: Computational Algebraic Geometry	Yale-NUS College 2016
Shreyasa Pradhan Topic: The Mathematics of Fair Division	Yale-NUS College 2016

Undergraduate Summer Research Mentorship

Computational geometry for neuroscience - Zhong Xuan Khwa - Elaine Wijaya - Karolina Grzeszkiewicz - Haroun Chahed	Yale-NUS College 2020 2020 2020 2017
Kelman transformations and Tutte polynomials - Narayani Tulsian	Yale-NUS College 2017
Topological representations of dual matroids - Jolanda Nava	Yale-NUS College 2017
Betti numbers of random threshold graphs - Christian Go	Yale-NUS College 2016
Topological upper bounds on Folkman numbers - Lassi Helanti	Aalto University 2013
Discrete Morse and matching complexes of simplices - Henry Kirveslahti	Aalto University 2013

Academic Enrichment & Outreach

Mentor Quest at Singapore American School	2020
Speaker Speaking of... Series (Yale-NUS College Library)	Nov 2019
Speaker Liberal Arts and the Environment Series (Yale-NUS College)	2019
Residential Fellow Elm College (Yale-NUS College)	2019 – 2020
Guest Math Circle Instructor Bridge to Enter Advanced Mathematics	2018
Visiting Instructor Canada/USA Mathcamp	2014, 2015 & 2018
Speaker Yale-NUS College Diversity Week	2018
Panelist Yale-NUS College Forum on Race in Higher Education	2017
Instructor Yale-NUS Math Circle	2016 & 2017
Judge Singapore Science and Engineering Fair	2016 & 2017
Instructor Singapore Ministry of Education Mathematics Enrichment Workshop	2017
Facilitator Yale-NUS Intergroup Dialogue	2016
Organizer Yale-NUS Math Circle	2016
Instructor Matematiikkaleiri (Helsinki-area high school math camp)	2012 & 2013
Graduate Assistant Valparaiso University REU Program	2010
Assistant Coach American Regions Math League Northern California Team	2008

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Selected Plenary Talks & Colloquia

Claremont Colleges Math Colloquium Harvey Mudd College Claremont, CA	Mar 2019
Colloquium Seattle University Seattle, WA	Dec 2018
Special Colloquium University of Oklahoma Norman, OK	Nov 2018
Colloquium Western Washington University Bellingham, WA	Oct 2018
Colloquium Canada/USA Mathcamp Denver, CO	Jul 2018
STEM Innovation Symposium Yale-NUS College Singapore	Apr 2017

Selected Invited Talks

Algebra/Combinatorics Seminar Washington University St. Louis, MO	Nov 2018
Combinatorics and Geometry Seminar University of Washington Seattle, WA	Oct 2018
Combinatorics Seminar KTH Royal Institute of Technology Stockholm, Sweden	Sep 2017
Topology & Geometry Seminar National University of Singapore Singapore	Nov 2016
Geometry, Algebra & Combinatorics Seminar Northeastern University Boston, MA	Sep 2016
Discrete Geometry and Combinatorics Seminar Cornell University Ithaca, NY	Oct 2014
Algebra and Combinatorics Seminar North Carolina State University Raleigh, NC	Feb 2014
Algebra and Combinatorics Seminar Aalto University Helsinki, Finland	Nov 2012
Representation Theory and Combinatorics Seminar University of California Davis, CA	Jun 2012
Algebra and Geometry Seminar Stockholm University Stockholm, Sweden	May 2012
Combinatorics Seminar California Institute of Technology Pasadena, CA	Dec 2011
Discrete Geometry Seminar Freie Universität Berlin, Germany	May 2011
Combinatorics Seminar University of California Berkeley, CA	May 2011

Selected Conference Presentations

AMS Western Sectional Meeting University of Hawaii, Manoa <i>Special Session on Algebraic and Geometric Combinatorics</i>	Mar 2019
Joint Mathematics Meetings San Diego, CA <i>Special Session on Combinatorial Commutative Algebra and Polytopes</i>	Jan 2018
Data Sciences: Bridging Mathematics, Physics and Biology IMS, Singapore <i>Workshop on Geometry and Shape Analysis in Biological Sciences</i>	Jun 2017
AMS Western Sectional Meeting San Francisco State University <i>Special Session on Topological Combinatorics and Commutative Algebra</i>	Oct 2014
Formal Power Series and Algebraic Combinatorics Paris, France	Jun 2013
Nordic Combinatorial Conference Stockholm, Sweden	Jun 2013
Effective Methods in Algebraic Geometry Frankfurt, Germany	Jun 2013
AMS Southeastern Sectional Meeting Wake Forest University <i>Special Session on Algebraic and Geometric Aspects of Matroids</i>	Sep 2011
Joint Mathematics Meetings New Orleans, LA <i>MAA Undergraduate Poster Session</i>	Jan 2007
MAA Mathfest Knoxville, TN	Aug 2006
Joint Mathematics Meetings San Antonio, TX <i>MAA Undergraduate Poster Session</i>	Jan 2006

Organization & Service

Member

- Yale-NUS College Committee on Teaching, Learning, and Assessment 2019 – 2020
- Yale-NUS College Committee on Diversity and Inclusion Semester 2 | 2018
- Yale-NUS College Task Force for Peer Observation of Teaching Semester 2 | 2017
- Yale-NUS College Advisory Committee on Admissions and Financial Aid 2016 – 2017
- Yale-NUS College Task Force for Teaching with Technology Semester 2 | 2016

Organizer

- Mathematical, Computational & Statistical Sciences Seminar at Yale-NUS 2015 – 2017
- Combinatorics Seminar at KTH 2013 – 2015
(with A. Björner, P. Brändén, and S. Linusson)
- AMS Southwestern Section Meeting Apr 2015
Special Session on Algebra-Geometric Methods in Graph Theory (with M. Omar)
- Algebra and Combinatorics Seminar at Aalto University 2012 – 2013
(with A. Engström and C. Hollanti)
- AMS Joint Math Meeting 2013
Special Session on Topological Combinatorics (with A. Engström and S. Klee)
- AMS Southeastern Section Meeting Oct 2012
Special Session on Algebraic and Topological Combinatorics (with A. Engström)
- Student Discrete Math Seminar at UC Davis 2008 – 2010
(with S. Pon and J. Ferreira)

Referee

- Advances in Applied Mathematics; Discrete Mathematics; European Journal of Combinatorics; Formal Power Series and Algebraic Combinatorics; Journal of Algebra, Combinatorics, Discrete Structures & Applications; Journal of Combinatorial Theory Series A; Journal of the Indian Mathematical Society

Reviewer

- AMS Mathematical Reviews

Volunteer

- Yale-NUS Open Day Mar 2016 & 2017
- Experience Yale-NUS Weekend Apr 2016 & 2017
- Joint Math Meetings MAA Undergraduate Poster Competition 2012 & 2013
- Bay Area Discrete Math Day at UC Davis Apr 2009
- Graduate Student Combinatorics Conference at UC Davis Apr 2008