Matthew T. Stamps

+1 (616) 828-5650 – matthewstamps@gmail.com – www.mattstamps.com

Summary

- Mathematics PhD with 9 years of international academic research experience.

- Expert at employing fundamental techniques from algebra, geometry, and topology to develop innovative solutions to computationally challenging problems in theoretical and applied mathematics.

- Established track record of publications in top-tier academic journals.
- Proficient with Python, Java, R, Maple, and PostScript.

Experience

Assistant Professor of Science | **Yale-NUS College** | Singapore — Jul 2015 – Dec 2020

- Conducted independent and collaborative research in algebraic graph theory, applied geometry, combinatorial commutative algebra, and topological combinatorics, yielding multiple publications in top-tier academic journals.
- Co-led an interdisciplinary computational neuroscience research team that used differential geometry, time series analysis, dynamic programming, and statistical inference to detect and measure dissimilarities in locomotory animal behaviors, resulting in the development of the locomotion Python package (https://pypi.org/project/locomotion/).
- Designed and taught 11 undergraduate mathematics courses on a broad range of topics including computational modeling, discrete mathematics, abstract algebra, creative problem-solving, and the foundations of modern geometry.
- Mentored 15 undergraduate student research projects on a variety of topics including automated speech pattern analysis, topological data analysis, algebraic coding theory, algebraic/extremal graph theory, combinatorial commutative algebra, the geometry of computer-generated animation, and the geometry of gerrymandering.

Research Fellow | **KTH Royal Institute of Technology** | Stockholm, Sweden — Jul 2013 – Jun 2015

- Funded by NSF International Research Fellowship Award #1159206.
- Conducted research in applied geometry and topological combinatorics under the guidance of Svante Linusson.
- Taught a graduate course on applied combinatorics and supervised 2 undergraduate summer research projects.

Postdoctoral Researcher | **Aalto University** | Helsinki, Finland — Jan 2012 – Jun 2013

- Conducted research in combinatorial commutative algebra under the guidance of Alexander Engström.
- Co-taught 2 graduate courses on the representation and invariant theories of finite groups and applied algebraic topology.

Explore Math Director | **University of California** | Davis, CA, USA — Sep 2009 – Aug 2011

- Directed the 2010 UC Davis Math Circle and 2011 Northern California team of the American Regions Math League (ARML) within Explore Math, an NSF VIGRE-funded high school enrichment initiative run by graduate students at UC Davis.
- Hired graduate student instructors, supervised undergraduate student teaching assistants, organized weekly guest speakers, managed program budgets, recruited participants, and coordinated a team trip to an annual competition in Las Vegas, NV.

Education

PhD in Mathematics | **University of California** | Davis, CA, USA — Sep 2007 – Dec 2011

- Advisor: Eric Babson.
- Dissertation: Topological Methods in Matroid Theory.
- Awards & Distinctions: NSF VIGRE and USDE GAANN Graduate Fellowships and Yueh-Jing Lin Scholarship in Mathematics.

BSc in Mathematics | **Grand Valley State University** | Allendale, MI, USA — Aug 2003 – May 2007

- Advisor: David Austin.
- Awards & Distinctions: Magna Cum Laude, Glenn A. Niemeyer Outstanding Student Award, GVSU Outstanding Mathematics Student Award, GVSU Award for Excellence, MAA Joint Math Meetings Undergraduate Poster Prize Winner.

Research

Significant Contributions

- Pioneered a new technique in algebraic graph theory for counting the number of spanning trees in a graph via rank-one perturbations of its Laplacian matrix, yielding new simple proofs of numerous spanning tree enumeration formulas.

- Characterized instances of Simpson's paradox in 3-way contingency tables using regular triangulations of the cube.

- Discovered one-to-one-to-one correspondences between three important families of graphs, integer sequences, and numerical invariants of modules of polynomial rings, enabling the extension of a random model in graph theory to enumerative combinatorics and commutative algebra.

- Established the functoriality of a class of topological representations for matroids, yielding new simple and intuitive proofs of known theorems about characteristic polynomials and Whitney numbers of matroids.

- Designed an evolutionary heuristic algorithm for solving the Minimum Tollbooth Problem (MINTB).

Publications

- Coauthored 10 published articles and 3 preprints under review by top-tier academic journals in algebraic graph theory, applied geometry, combinatorial commutative algebra, topological combinatorics, and transportation optimization.

- Complete list of written work available on my website (www.mattstamps.com/research.html) and Google Scholar.

Software

- Project lead for the locomotion Python package (https://pypi.org/project/locomotion/), which provides computational geometric tools for the quantitative analysis of locomotory animal behaviors.

Speaking Engagements

- More than 50 invited talks and conference presentations in 30+ cities across North America, Europe, and Asia.

Recognition & Support

- Recipient of more than $300,000 in competitive grant awards.

Diversity & Inclusion

Facilitator | **Intergroup Dialogue** | Yale-NUS College

- Co-facilitated an 8-week, structured conversation on race and ethnicity between 16 undergraduate students from different social identity groups that encouraged participants to explore singular and intersecting aspects of their identities while critically examining dynamics of power, privilege, diversity and inequity in society.

Panelist | **Forum on Race in Higher Education** | Yale-NUS College

- Contributed to a panel discussion, open to the entire College community, on implicit bias in peer and student evaluations.

Speaker | **Diversity Week** | Yale-NUS College

- Addressed a general audience on algorithmic bias and the role of data science in an assortment of social justice issues.

Inaugural Member | **Committee on Diversity & Inclusion** | Yale-NUS College

Academic Enrichment & Outreach

Multi-Day High School Math Enrichment Programs

- Taught 5 mini-courses at the Canada/USA Mathcamp, an immersive summer program for mathematically talented high school students from across North America, and Matematiikkaleiri, a weekend math enrichment program for Helsinki-area high school students, on various topics including the shape of space and the mathematics of the card game, Set.

Single-Day Math Circles & Workshops

- Regular volunteer at math circles and workshops such as Bridge to Enter Advanced Mathematics, the Yale-NUS Math Circle, the Singapore MoE Maths Enrichment Workshop, and the Oakland/East Bay Math Circle.