

Justin M. Troyka

Curriculum Vitae

Davidson College
Department of Mathematics and Computer Science
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ACADEMIC POSITIONS

Visiting Assistant Professor, Davidson College, Davidson, NC July 2020–present
Department of Mathematics and Computer Science

Postdoctoral Visitor, York University, Toronto, ON July 2018–
Department of Mathematics and Statistics June 2020
Supervisor: Neal Madras

EDUCATION

PhD in Mathematics, Dartmouth College, Hanover, NH June 2018
Advisor: Sergi Elizalde
Area: Enumerative and algebraic combinatorics
Thesis: *Permutations: Descents, cycles, and patterns*

AM in Mathematics, Dartmouth College, Hanover, NH November 2014

BA in Mathematics, Carleton College, Northfield, MN June 2013
Summa cum laude, Phi Beta Kappa

PUBLICATIONS

Bounded affine permutations II. Avoidance of decreasing patterns, with N. Madras, *Ann. Comb.*, <https://doi.org/10.1007/s00026-021-00553-4>. 2021

Bounded affine permutations I. Pattern avoidance and enumeration, with N. Madras, *Discrete Math. Theor. Comput. Sci.* **22**(2): #1. 2021

Split graphs: Combinatorial species and asymptotics, *Electron. J. Combin.* **26**: #P2.42. 2019

On the centrosymmetric permutations in a class, *Australas. J. Combin.* **74**: 423–442. 2019

Exact and asymptotic enumeration of cyclic permutations according to descent set, with S. Elizalde, *J. Combin. Theory Ser. A* **165**: 360–391. 2019

Restricted symmetric signed permutations, with A. Hardt, *Pure Math. Appl.* **23**: 179–217. 2012

UNPUBLISHED PAPERS AND WORK IN PROGRESS

On pattern avoidance in matchings and involutions , with J. J. Fang and Z. Hamaker, arXiv:2009.00079 , submitted for publication.	2021
Fibonacci numbers, consecutive patterns, and inverse peaks , with Y. Zhuang, arXiv:2109.14774 , submitted for publication.	2021
Permutation statistics on clusters , with Y. Zhuang, in progress.	2021
Growth rates of permutations with a given descent set , in progress.	2021
Period mimicry: A note on the (-1)-evaluation of the peak polynomials , arXiv:1907.06681 .	2019
Combinatorial species and graph enumeration (undergraduate senior thesis), with A. Hardt, P. McNeely, & T. Phan, arXiv:1312.0542 . <i>A concise expository introduction to the theory of combinatorial species.</i>	2013

PRESENTATIONS

* Seminar talk at home institution

** Invited talk

**University of South Carolina Discrete Mathematics Seminar <i>Split graphs: Combinatorial species and asymptotics</i>	September 2021
Permutation Patterns Virtual Workshop, University of Strathclyde <i>On pattern avoidance in matchings and involutions</i>	June 2021
*York University Algebraic Combinatorics Seminar <i>Foulkes' Conjecture and its generalizations</i>	February 2020
**Rochester Institute of Technology Discrete and Computational Math. Sem. <i>Split graphs: Combinatorial species and asymptotics</i>	January 2020
Joint Mathematics Meetings AMS Contributed Paper <i>Split graphs: Combinatorial species and asymptotics</i>	January 2020
*York University Discrete Mathematics Seminar <i>The cycle lemma</i>	December 2019
**AMS Sectional Meeting Special Session on Patterns in Permutations <i>Pattern-avoiding affine permutations</i>	November 2019
*York University Applied Algebra Seminar <i>Combinatorial species and counting split graphs</i>	October 2019
Permutation Patterns Conference, University of Zürich <i>Classes of sum-decomposable affine permutations</i>	June 2019
**College at Brockport, State University of New York, Combinatorics Sem. <i>Split graphs: Combinatorial species and asymptotics</i>	May 2019
*York University Applied Algebra Seminar <i>Exact and asymptotic enumeration of cyclic permutations according to descent set</i>	February 2019
*York University Discrete Mathematics Seminar <i>Permutation patterns</i>	October 2018

Formal Power Series and Algebraic Combinatorics, Dartmouth College <i>The number of cycles with a given descent set</i> (poster)	July 2018
Permutation Patterns Conference, Dartmouth College <i>Thresholds of growth rates of sum-closed classes</i>	July 2018
Joint Mathematics Meetings AMS Contributed Paper <i>Exact and asymptotic enumeration of cyclic permutations according to descent set</i>	January 2018
*Dartmouth College Combinatorics Seminar <i>Combinatorial proofs of power-series identities</i>	November 2017
Permutation Patterns Conference, Reykjavík University <i>On the growth rate of the centrosymmetric permutations in a class</i>	June 2017
Graduate Student Combinatorics Conference, University of Kansas <i>Exact and asymptotic enumeration of classes of centrosymmetric permutations</i>	April 2017
**Brandeis University Combinatorics Seminar <i>Exact and asymptotic enumeration of cycles according to descent set</i>	November 2016
Summer Combo in Vermont, Saint Michael's College <i>Exact and asymptotic enumeration of cycles according to descent set</i>	July 2016
Permutation Patterns Conference, Howard University <i>Exact and asymptotic enumeration of cycles according to descent set</i>	June 2016
Graduate Student Combinatorics Conference, Clemson University <i>Exact and asymptotic enumeration of cycles according to descent set</i>	April 2016
*Dartmouth College Combinatorics Seminar <i>Exact and asymptotic enumeration of cycles according to descent set</i>	March 2016

OTHER SCHOLARLY ACTIVITIES

AMS Special Session on Algebraic and Bijective Methods in Permutation Enumeration: co-organizing a session of research talks at the Joint Mathematics Meetings	2022 (expected)
Mathematical Reviews: wrote 2 reviews.	2021–present
Journal referee: <i>Discrete Math.</i> , <i>Discrete Math. Theor. Comput. Sci.</i> , <i>Electron. J. Combin.</i> , <i>European J. Combin.</i> , <i>J. Algebraic Combin.</i> , <i>J. Combin.</i> , <i>Turkish J. Math.</i>	2017–present
Recommendation letters: wrote for 6 undergraduate students.	2020–present
On-Line Encyclopedia of Integer Sequences: contributed to 15 entries.	2013–present
Davidson Math Challenge: ran my department's weekly math problem-solving contest for students.	2021–present
Advising student research: I am working informally with Luke Seaton, a mathematics student between undergraduate and graduate school, on continuing my recent research on patterns in affine permutations.	2021
MAA VITAL (Visitors, Instructors, TAs, Adjuncts, and Lecturers) Virtual Workshops: attended a series of four sessions for non-tenure track faculty in North Carolina to learn about research-based teaching methods.	2021

New social-justice learning outcome for mathematics major: drafted language for our new social-justice learning outcome.	2020
Digital Learning Institute: attended two weeks of virtual sessions about online learning.	2020
Discrete Mathematics Seminar: organized a biweekly research seminar at York University.	2019–2020
Respect, Equity, Diversity and Inclusion — Certificate of Completion: attended a series of four workshops offered by the Centre for Human Rights, Equity, and Inclusion at York University, on topics including sexual harassment and racism.	2019
TA Training Session: co-organized and co-presented a one-day program for graders and tutors at York University.	2019
Canadian Open Mathematics Challenge: Graded solutions from a high-school mathematics competition, helped with scanning and data entry.	2018, 2019
Formal Power Series and Algebraic Combinatorics: assisted in conference organizing at Dartmouth College.	2018
Dartmouth College Graduate Student Seminar: frequent speaker (3–4 talks each year).	2013–2018

TEACHING

Instructor, Davidson College	2020–present
<i>Designed and taught each course; wrote homework and exams; supervised undergraduate teaching assistants; delivered online and in-person courses incorporating lecture videos, group work, and conventional teaching.</i>	
MAT 108: Exploring Mathematical Ideas	Fall 2021
MAT 150: Linear Algebra (2 sections)	Fall 2021
MAT 108: Exploring Mathematical Ideas	Spring 2021
MAT 160: Calculus III	Spring 2021
MAT 108: Exploring Mathematical Ideas	Fall 2020
MAT 150: Linear Algebra	Fall 2020
MAT 160: Calculus III	Fall 2020
Instructor, York University	2018–2020
<i>Managed and taught each course, wrote homework and exams, supervised graduate-student teaching assistants, used in-class clicker polls to promote active learning in large classes.</i>	
MATH 1300: Differential Calculus with Applications	Spring 2020
MATH 1310: Integral Calculus with Applications	Fall 2019
MATH 1190: Introduction to Sets and Logic	Spring 2019
MATH 1013: Applied Calculus I	Fall 2018

Instructor , Dartmouth College <i>Designed and taught each course, wrote homework and exams, used a combination of group work and conventional teaching.</i>	2016–2018
MATH 8: Calculus of Functions of One and Several Variables	Winter 2018
MATH 3: Introduction to Calculus	Fall 2016
MATH 2: Calculus with Algebra and Trigonometry	Winter 2016
Combinatorics Teaching Assistant , Dartmouth College <i>Held tutorial sessions once a week, graded homework, was substitute instructor for one week.</i>	Fall 2017
MATH 68: Algebraic Combinatorics	
Dartmouth Mathematics Teaching Seminar <i>An intensive summer-long course in the theory and practice of teaching. Learned and discussed educational philosophies, course design, and classroom techniques; designed and taught two week-long math camps for local middle- and high-school students.</i>	Summer 2015
Teaching Assistant , Dartmouth College <i>Held tutorial sessions three times a week; graded exams.</i>	2013–2015
MATH 24: Linear Algebra	Spring 2015
MATH 8: Calculus of Functions of One and Several Variables	Fall 2014
MATH 8: Calculus of Functions of One and Several Variables	Winter 2014
MATH 11: Accelerated Multivariable Calculus	Fall 2013

AWARDS

NSF Graduate Research Fellowship Program: Honorable Mention <i>A national achievement, awarded according to the NSF Merit Review Criteria of Intellectual Merit and Broader Impacts.</i>	2015
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OUTSIDE OF ACADEMIA

In my free time, I am a singer, pianist, and composer. The songs I have written and recorded are available for listening at

<https://soundcloud.com/justin-troyka/sets/home-solo-recordings>.

I was in a rock band in college, and I have played trumpet in community and school orchestras.