Calum Buchanan

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Education

University of Vermont (UVM), Burlington, VT
Ph.D. Candidate, Mathematics, 2019 – present
Research interests: Graph Theory, Combinatorics
Advisor: Dr. Puck Rombach
B.A. in Mathematics and English, December 2017
GPA 3.87, English Departmental Honors Recipient,
Presidential and Merit Scholarships

Université de Nantes, Nantes, France
International Student Exchange Program (ISEP), Jan. – May 2016

Teaching

* indicates that lesson plans are available at www.uvm.edu/~cjbuchan

Department of Mathematics and Statistics, UVM
Graduate Primary Instructor (PI) / Teaching Assistant (TA)
Math1212*: Fundamentals of Calculus I
Fall 2019 (PI), Fall 2020 (TA), Fall 2021 (PI)
Math1077*: Exploring Modern Mathematics
Spring 2020 (PI), Spring 2021 (PI), Spring 2024 (PI)

Johns Hopkins Center for Talented Youth, Bristol, RI
Teaching Assistant, Paradoxes and Infinities, Summer 2017/2018

Collège Le Grand Beauregard, La Chapelle sur Erdre, France
Instructor, Conversational English, 2018 – 2019

Collège La Coutancière, La Chapelle sur Erdre, France
Instructor, Conversational English, 2018 – 2019

Math Outreach
Prepared outreach lessons on combinatorics for high school students in VT*
Gave a lesson on breaking symmetries using colors at the 2023 MathCounts
NW VT Chapter Competition for middle school students

Tutoring, Burlington, VT
UVM Tutoring Center, 2016 – 2018
Private tutoring, 2016 – present

Research

Department of Mathematics & Statistics, UVM

Tropical Geometry of Rado Matroids, CB, Rick Danner; *arXiv:2402.04186*, 2024.

Node Placement to Maximize Reliability of a Communication Network with Application to Satellite Swarms, CB, James Bagrow, Puck Rombach, Hamid Ossareh; *2023 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*.

Toughness of recursively partitionable graphs, CB, Brandon Du Preez, K. E. Perry, Puck Rombach; *Theory and Applications of Graphs*, 2022.

Path odd-covers of graphs, Steffen Borgwardt, CB, Eric Culver, Bryce Frederickson, Puck Rombach, Youngho Yoo; *arXiv:2306.06487*, 2023.

Odd covers of graphs, CB, Alexander Clifton, Eric Culver, Jiaxi Nie, Jason O'Neill, Puck Rombach, Mei Yin; *J. Graph Theory*, 104:420–439, 2023.

On the last new vertex visited by a random walk in a directed graph, CB, Paul Horn, Puck Rombach; *Discrete Math. Lett.*, 11:96–98, 2023.

Subgraph complementation and minimum rank, CB, Christopher Purcell, Puck Rombach; *Electr. J. Comb.*, 29(1), Feb 2022.

Graduate Research Assistant, UVM
NASA grant, August 2022 – January 2024

Workshops

Graduate Research Workshop in Combinatorics (GRWC)
Online, June 14 – 25, 2021
Denver, CO, July 25 – August 5, 2022

Masamu Advanced Study Institute (MASI) and Workshops
Online, November 20 – 29, 2020
Online, November 19 – 28, 2021

Awards

Nam Sang Kil Scholarship in Mathematics, UVM
2023

Graduate Teaching Assistant of the Year, UVM
Lecture Instruction Category, 2021

John F. Kenney Award, UVM
Excellence in mathematics, 2021

American Mathematical Society Travel Grant
Joint Mathematics Meetings, Virtual 2021, San Francisco 2024

The Phi Beta Kappa Society
Alpha of Vermont, 2017

Coursework

Mathematical Sciences Research Institute (MSRI), Berkeley, CA
Random Graphs summer graduate school, July 2022

University of Vermont
Mathematics
- Combinatorics: Spectral Graph Theory, Extremal Graph Theory, Probabilistic Combinatorics, Matroids, Polytopes, Symmetric Functions
- Other: Analysis (functional, real, complex, measure), Algebraic Geometry, Algebraic Topology, Linear & Abstract Algebra, Chaos, O.D.E.'s

English: Advanced Writing Workshops in Poetry, Creative Nonfiction, Literary Journalism, and Short Fiction

Relevant Skills

Languages
English (native), French (advanced)

Coding
LaTeX, HTML, SageMath