

Robert Bailey

Curriculum Vitae

Personal details

Robert Francis Bailey

Citizenship: British and Canadian

Languages: English (mother tongue), French (moderate)

Address

School of Science and Environment (Mathematics)
Memorial University of Newfoundland
Grenfell Campus
Corner Brook, NL A2H 6P9
Canada
Telephone: +1 709-637-6293

E-mail: rbailey@grenfell.mun.ca

Homepage: www2.grenfell.mun.ca/rbailey/

Career History

From August 2015: Assistant Professor (Limited Term), School of Science and Environment (Mathematics), Grenfell Campus, Memorial University of Newfoundland.

August 2013–April 2015: Visiting Assistant Professor (Limited Term), Division of Science (Mathematics), Grenfell Campus, Memorial University of Newfoundland.

September 2012–August 2013: Postdoctoral Fellow and Instructor, Department of Mathematics, Ryerson University, Toronto.

September 2011–August 2012: Postdoctoral Fellow, Department of Mathematics and Statistics, University of Regina.

September 2009–August 2011: PIMS Postdoctoral Fellow, Department of Mathematics and Statistics, University of Regina.

September 2007–August 2009: Postdoctoral Fellow and Instructor, School of Mathematics and Statistics, Carleton University, Ottawa.

Education

September 2002–December 2005: Ph.D. in Mathematics, Queen Mary, University of London.
Thesis: *Permutation groups, error-correcting codes and uncoverings*.
Supervisor: Prof. P. J. Cameron; second supervisor: Prof. R. A. Bailey.

September 1998–June 2002: University of Leeds, except for September 2000–April 2001 spent at University of Waterloo.

Degree awarded: M.Math. (Honours Class I), Mathematics (North America), University of Leeds, 2002.¹
Dissertation: *Distance-transitive graphs* (expository), supervisor Prof. H. D. Macpherson.

¹This was an extended undergraduate programme which culminated in the award of a Masters' degree.

Teaching Experience

At Grenfell Campus, Memorial University of Newfoundland

- Winter 2017: Math 1001 *Calculus II*
Class size: 35 (1st year students in multiple disciplines)
- Winter 2017: Math 3000 *Real Analysis I*
Class size: 18 (3rd/4th year students in mathematics)
- Fall 2016: Math 1052 *Mathematics for Business*
Class size: 60 (primarily 1st year students in business)
- Winter 2016: Math 1001 *Calculus II*
Class size: 50 (1st year students in multiple disciplines)
- Winter 2016: Math 4290 *Advanced Graph Theory*
Class size: 13 (3rd/4th year students in mathematics)
- Fall 2015: Math 2050 *Linear Algebra I*
Class size: 12 (1st/2nd year students in mathematics and science)
- Fall 2015: Stat 2550 *Statistics for Science Students*
Class size: 15 (2nd year students in mathematics and science)
- Winter 2015: Math 1000 *Calculus I*
Class size: 40 (1st year students in multiple disciplines)
- Winter 2015: Math 3000 *Real Analysis I*
Class size: 18 (3rd/4th year students in mathematics)
- Fall 2014: Math 1001 *Calculus II*
Class size: 35 (1st year students in multiple disciplines)
- Fall 2014: Math 2000 *Calculus III*
Class size: 16 (2nd year students in mathematics and science)
- Winter 2014: Math 1001 *Calculus II*
Class size: 60 (1st year students in multiple disciplines)
- Winter 2014: Math 2320 *Discrete Mathematics*
Class size: 20 (2nd year students in mathematics and science)
- Fall 2013: Math 1000 *Calculus I*
Class size: 55 (1st year students in multiple disciplines)
- Fall 2013: Math 2000 *Calculus III*
Class size: 25 (2nd year students in mathematics and science)

At Ryerson University

- Fall 2012: MTH330 *Calculus and Geometry*
Class size: 120 (2nd year students in science and mathematics)

At the University of Regina

- Winter 2012: Math122 *Linear Algebra I*
Class size: 75 (1st year students in mathematics, science, engineering and business)
- Winter 2012: Math890AL *Permutation Groups*
Class size: 1 (reading course; graduate student in mathematics)
- Fall 2011: Stat100 *Elementary Statistics for Applications*
Class size: 120 (1st year students in biological sciences, business and social sciences)

- Winter 2011: Math828 *Combinatorics*, cross-listed as Math890AL *Permutation Groups*
Class size: 2 (graduate students in mathematics)
- Fall 2010: Stat100 *Elementary Statistics for Applications*
Class size: 155 (1st year students in biological sciences, business and social sciences)
- Winter 2010: Math122 *Linear Algebra I*
Class size: 50 (1st year students in mathematics, science, engineering and business)
- Fall 2009: Math122 *Linear Algebra I*
Class size: 150 (1st year students in engineering)

At Carleton University

- Summer 2009: MATH2107 *Linear Algebra II*
Class size: 45 (2nd year students in mathematics and science)
- Fall 2008: MATH1009 *Calculus for Business and Economics*
Class size: 145 (1st year students in business)
- Summer 2008: MATH1009 *Calculus for Business and Economics*
Class size: 45 (1st year students in business)
- Winter 2008: MATH3107 *Linear Algebra III*
Class size: 60 (3rd year students in mathematics and science)

At Queen Mary, University of London

- Summer 2007: SEJ015 *Discrete Mathematics*
Class size: 5 (pre-university foundation year students)
- Summer 2006: SEJ015 *Discrete Mathematics*
Class size: 6 (pre-university foundation year students)

Research Interests

In the area of algebraic combinatorics, studying combinatorial and algebraic structures and the links between them. My main interests are in the following areas:

- algebraic and metric graph theory;
- combinatorial design theory;
- error-correcting codes;
- permutation groups.

Other combinatorial topics (including association schemes, enumeration, hypergraphs, matroids and combinatorial matrix theory) are also of interest.

Publications

Papers published in refereed journals

1. *Uncoverings-by-bases for base-transitive permutation groups*, *Designs, Codes and Cryptography* **41** (2006), 153–176.
2. *Distance enumerators of permutation groups* (with J. P. Dixon), *Communications in Algebra* **35** (2007), 3045–3051.
3. *Decoding the Mathieu group M_{12}* (with J. N. Bray), *Advances in Mathematics of Communications* **1** (2007), 477–487.

4. *On the single-orbit conjecture for uncoverings-by-bases* (with P. J. Cameron), *Journal of Group Theory* **11** (2008), 845–850.
5. *Error-correcting codes from permutation groups*, *Discrete Mathematics* **309** (2009), 4253–4265.
6. *Hamiltonian decompositions of complete k -uniform hypergraphs* (with B. Stevens), *Discrete Mathematics* **310** (2010), 3088–3095.
7. *Base size, metric dimension and other invariants of groups and graphs* (with P. J. Cameron), *Bulletin of the London Mathematical Society* **43** (2011), 209–242.
8. *Uncoverings on graphs and network reliability* (with B. Stevens), *Australasian Journal of Combinatorics* **50** (2011), 219–231.
9. *Generalized covering designs and clique coverings* (with A. C. Burgess, M. S. Cavers and K. Meagher), *Journal of Combinatorial Designs* **19** (2011), 378–406.
10. *On the metric dimension of Grassmann graphs* (with K. Meagher), *Discrete Mathematics and Theoretical Computer Science* **13:4** (2011), 97–104.
11. *Decoding generalised hyperoctahedral groups and asymptotic analysis of correctible error patterns* (with T. Prellberg), *Contributions to Discrete Mathematics* **7:1** (2012), 1–14.
12. *Resolving sets for Johnson and Kneser graphs* (with J. Cáceres, D. Garijo, A. González, A. Márquez, K. Meagher and M. L. Puertas), *European Journal of Combinatorics* **34** (2013), 736–751.
13. *Generalized packing designs* (with A. C. Burgess), *Discrete Mathematics* **313** (2013), 1167–1190.
14. *A note on packing spanning trees in graphs and bases in matroids* (with M. W. Newman and B. Stevens), *Australasian Journal of Combinatorics* **59:1** (2014), 24–38.
15. *The metric dimension of small distance-regular and strongly regular graphs*, *Australasian Journal of Combinatorics* **62:1** (2015), 18–34.
16. *On generalized Howell designs with block size three* (with R. J. R. Abel, A. C. Burgess, P. Danziger and E. Mendelsohn), *Designs, Codes and Cryptography* **81** (2016), 365–391.
17. *On the metric dimension of imprimitive distance-regular graphs*, *Annals of Combinatorics* **20** (2016), 641–659.

Papers submitted to refereed journals

18. *Error-correcting codes from k -resolving sets* (with I. G. Yero); arXiv:1605.03141.
19. *On the metric dimension of incidence graphs*; arXiv:1707.02899.

Papers in preparation

20. *On orthogonal matrices with zero diagonal* (with R. Craigen).

Non-refereed publications

- www.distanceregular.org, an online database of distance-regular graphs, 2016–present (developed with assistance from A. D. M. Jackson and C. H. Weir).

Research talks

I have given colloquium/seminar talks about my research at the following universities: California Institute of Technology; Carleton University; Imperial College London; Memorial University of Newfoundland (St. John's); Portland State University; Queen Mary, University of London; Ryerson University; Simon Fraser University; University of Auckland; University of New South Wales; University of Ottawa; University of Regina; University of St. Andrews; University of Winnipeg.

I have given talks about my research at conferences in: Canada (30); United Kingdom (15); Italy (3); United States (2); Australia (1); Germany (1); New Zealand (1); Slovenia (1); Malta (1); Portugal (1).

Recent conference talks

- *Base size and orbital dimension for permutation groups* (invited talk), All Kinds of Mathematics..., Universidade de Lisboa, Lisbon, Portugal, 25 July 2017.
- *A database of distance-regular graphs*, 26th British Combinatorial Conference, University of Strathclyde, 3 July 2017.
- *Orthogonal matrices with zero diagonal*, 2nd Malta Conference in Graph Theory and Combinatorics, Qawra, Malta, 27 June 2017.
- *Metric dimension of incidence graphs*, East Coast Combinatorics Conference, Mount Saint Vincent University, 18 July 2016.
- *Metric dimension of incidence graphs*, Canadian Mathematical Society Summer Meeting 2016 (invited to speak in session on “Algebraic Graph Theory”), University of Alberta, 25 June 2016.
- *Generalized Howell designs*, Prairie Discrete Mathematics Workshop 2016, University of Manitoba, 16 May 2016.
- *Generalized Howell designs*, East Coast Combinatorics Conference, Mount Allison University, 28 July 2015.
- *On the metric dimension of imprimitive distance-regular graphs, II*, 25th British Combinatorial Conference, University of Warwick, 6 July 2015.
- *Metric dimension of imprimitive distance-regular graphs*, 8th Slovenian Conference on Graph Theory, Kranjska Gora, Slovenia, 26 June 2015.
- *Metric dimension of distance-regular graphs: a triennial update*, Canadian Mathematical Society Summer Meeting 2015 (session on “Graphs, Designs and Hypergraphs”), University of Prince Edward Island, 6 June 2015.
- *Metric dimension of imprimitive distance-regular graphs, II*, Discrete Mathematics Days and Ontario Combinatorics Workshop, University of Ottawa, 24 May 2015.
- *Metric dimension of graphs and metric spaces*, Science Atlantic Mathematics, Statistics & Computer Science Conference, University of New Brunswick Saint John, 4 October 2014.
- *Computing the metric dimension of distance-regular graphs*, Combinatorics 2014, Gaeta, Italy, 3 June 2014.
- *On the metric dimension of imprimitive distance-regular graphs*, 24th British Combinatorial Conference, Royal Holloway University of London, 1 July 2013.
- *Generalized packing designs with block size five*, CanaDAM 2013 (invited to speak in mini-symposium in honour of Prof. E. Mendelsohn), Memorial University of Newfoundland, 10 June 2013.
- *Generalized packing designs with block size five*, Ontario Combinatorics Workshop, Nipissing University, 16 May 2013.
- *Metric dimension of imprimitive distance-regular graphs*, Ottawa–Carleton Discrete Mathematics Days, University of Ottawa, 10 May 2013.
- *Distinguishing numbers and regular orbits*, SIAM Conference on Discrete Mathematics (invited to speak in mini-symposium on “Graphs and Groups”), Dalhousie University, 20 June 2012.
- *Metric dimension of distance-regular graphs: an update*, Canadian Mathematical Society Summer Meeting 2012 (invited to speak in session on “Combinatorics”), Regina, 2 June 2012.

Forthcoming conference talk: 5th International Combinatorial Conference, Melbourne, Australia, December 2017.

Student supervision

- May–August 2016: Adam Jackson, undergraduate research assistant (full-time).
- October 2016–March 2017: Courtney Weir, undergraduate research assistant (part-time).

Graduate student examination

July 2010: A. Purdy, M.Sc. thesis, Department of Mathematics & Statistics, University of Regina.

January 2016: R. Luther, M.Sc. thesis, Department of Mathematics & Statistics, Memorial University of Newfoundland.

Grants and awards

- 2016–21: NSERC Discovery Grant, to support *Graphs, Designs, Codes and Groups: Topics in Algebraic Combinatorics*, C\$18,000/year for five years.
- 2017–19: Seed, Bridge & Multidisciplinary Grant (with R. P. Gallant and T. M. Ngatched), Memorial University of Newfoundland, C\$10,000.
- 2016–18: Startup Grant, Memorial University of Newfoundland, C\$10,000, plus C\$15,000 to support a postdoctoral fellow.
- 2016–17: MUCEP Research Grant (Memorial University of Newfoundland), to support an undergraduate research assistant for 40 hours' work
- 2015: AARMS (Atlantic Association for Research in the Mathematical Sciences) grant, to support *Graphs, Designs and Hypergraphs* session at 2015 Canadian Mathematical Society Summer Meeting (with A. C. Burgess and M.-E. Messinger), C\$3000.
- 2014: Vice-President's Research Fund (Grenfell Campus, Memorial University of Newfoundland), to support research project *Generalizations of Combinatorial Designs*, C\$1055.
- 2009–11: PIMS Postdoctoral Fellowship, C\$20,000/year for two years.
- 2004: London Mathematical Society Scheme 1 grant, to support 15th Postgraduate Combinatorial Conference, £1648.
- 2004 Ann Cook Prize, awarded by the School of Mathematical Sciences, Queen Mary, University of London, for an essay/poster competition for research students ending their second year.
- 2002–05: EPSRC CASE studentship (Co-operative Awards in Science and Engineering), part-sponsored by UK Government Communications Headquarters (GCHQ), £14,000/year for three years, plus £4200 travel allowance.

Organization of Research Events

Co-organizer of workshop *Symmetry Breaking in Discrete Structures*, Casa Matemática Oaxaca, Oaxaca, Mexico, 16–21 September 2018 (with D. L. Boutin, W. Imrich and T. W. Tucker).

Co-organizer of *FLIRT* (Friday Light Informal Research Talks), Grenfell Campus, January 2017–present (with D. Nadolny).

Co-organizer of minisymposium *Graphs, Designs and Hypergraphs* at Canadian Mathematical Society Summer Meeting, Charlottetown, 5–8 June 2015 (with A. C. Burgess and M.-E. Messinger).

Co-organizer of *Graphs, Designs and Algebraic Combinatorics*, University of Regina, 18–21 July 2011, and *Prairie Discrete Mathematics Workshop 2011*, University of Regina, 22–23 July 2011 (with S. M. Fallat and K. Meagher).

Co-organizer of *From Higman–Sims to Urysohn: Peter Cameron's 60th birthday conference*, University of Cumbria, Ambleside, UK, 23–26 August 2007 (with H. D. Macpherson, S. E. Rees and L. H. Soicher).

Organizer of *15th Postgraduate Combinatorial Conference*, Queen Mary, University of London, 20–22 April 2004.

Co-organizer of Ottawa–Carleton Combinatorics & Optimization Seminar, September 2008–April 2009 (with R. Naserasr).

Organizer of *QuIPS* (Queen Mary Internal Postgraduate Seminar), January–December 2003.

Peer review

Referee for the following journals: *Advances in Geometry*; *Applicable Analysis and Discrete Mathematics*; *Ars Combinatoria*; *Ars Mathematica Contemporanea*; *Australasian Journal of Combinatorics*; *Combinatorica*; *The Computer Journal*; *Discrete Applied Mathematics*; *Discrete Mathematics*; *Discrete Mathematics and Theoretical Computer Science*; *Electronic Journal of Combinatorics*; *European Journal of Combinatorics*; *Finite Fields and their Applications*; *Graphs and Combinatorics*; *IEEE Transactions on Information Theory*; *Information Processing Letters*; *International Journal of Computer Mathematics*; *Journal of Combinatorial Designs*; *Journal of Combinatorial Theory (Series A)*; *Journal of Geometry and Physics*; *Journal of Group Theory*.

Reviewer for *Mathematical Reviews*.

Reviewer for NSERC Discovery Grant program.

Reviewer for National Security Agency Mathematical Sciences Grant Program.

Other Activities

Professional Development

January–April 2014: *Teaching Skills Enhancement Program*, Distance Education, Learning and Teaching Support (DELTS), Memorial University of Newfoundland.

Professional Service

At Memorial University of Newfoundland

September 2016–present: Senate Committee on Research.

January–April 2017: Search Committee for Associate Vice-President (Grenfell Campus) Research & Graduate Studies.

October 2016–August 2017: Chair, Academic Planning Committee, Grenfell Campus.

September 2016–March 2017: Committee to draft constitution, School of Science & Environment, Grenfell Campus.

June–September 2016: Chair, Search Committee for Mathematics, Grenfell Campus.

August–December 2015: Search Committee for Computational Mathematics, Grenfell Campus.

Elsewhere

May–August 2009: Secretary, Carleton University Postdoctoral Association (CUPA).

Outreach

Judge for *Let's Talk Science: Design Challenge*, May 2015, May 2016 and May 2017.

Assisted with *Saskatchewan Mathematics Challenge* for Grade 7–10 students, March 2011.

Devised a set of *Mathematics Challenge* quiz questions for Year 7 students, September 2007.

Led or assisted with one-day courses for Year 11 and 12 students on graph theory, Ramsey theory and cryptography, 2005–2007.

Administration

Course Administrator for MAS115 *Calculus I* and MAS125 *Calculus II* (responsible for implementation of *MyMathLab* web-based course management system), Queen Mary, University of London, September 2006–May 2007.

Undergraduate recruitment/admissions assistant, Queen Mary, University of London, August–September 2004, August 2005, August–September 2006 and August 2007.

Memberships

2017–present: Canadian Mathematical Society.

2002–present: London Mathematical Society.

2003–2004: British Combinatorial Committee (student representative).

Referees

Names, addresses and contact information are available upon request.