

Robert Bailey Curriculum Vitae

Personal details

Robert Francis Bailey

Citizenship: British
Canadian Permanent Resident

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

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Employment History

September 2011–present

Postdoctoral Fellow, Department of Mathematics and Statistics, University of Regina.
Supervisors: Dr. K. Meagher and Dr. S. Zilles.

September 2009–August 2011

PIMS (Pacific Institute for the Mathematical Sciences) Postdoctoral Fellow, Department of Mathematics and Statistics, University of Regina.
Supervisor: Dr. K. Meagher.

September 2007–August 2009

Postdoctoral Fellow, School of Mathematics and Statistics, Carleton University, Ottawa.
Supervisors: Dr. B. Stevens (Carleton University) and Dr. L. Moura (University of Ottawa).

Education

September 2002–December 2005

Ph.D. in Mathematics, Queen Mary, University of London, approved January 2006.
Thesis title: *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.
Dissertation: *Distance-transitive graphs* (expository), supervisor Prof. H. D. Macpherson.

Research Interests

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

- finite permutation groups;
- algebraic and metric graph theory;
- aspects of design theory, especially covering and packing designs.

Other combinatorial topics (association schemes, error-correcting codes, hypergraphs, matroids, enumeration, etc.) are also of interest.

Publications

Papers published in refereed journals

- *Uncoverings-by-bases for base-transitive permutation groups*, Designs, Codes and Cryptography **41** (2006), 153–176.
- *Distance enumerators of permutation groups* (with J. P. Dixon), Communications in Algebra **35** (2007), 3045–3051.
- *Decoding the Mathieu group M_{12}* (with J. N. Bray), Advances in Mathematics of Communications **1** (2007), 477–487.
- *On the single-orbit conjecture for uncoverings-by-bases* (with P. J. Cameron), Journal of Group Theory **11** (2008), 845–850.
- *Error-correcting codes from permutation groups*, Discrete Mathematics **309** (2009), 4253–4265.
- *Hamiltonian decompositions of complete k -uniform hypergraphs* (with B. Stevens), Discrete Mathematics **310** (2010), 3088–3095.
- *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.
- *Uncoverings on graphs and network reliability* (with B. Stevens), Australasian Journal of Combinatorics **50** (2011), 219–231.
- *Generalized covering designs and clique coverings* (with A. C. Burgess, M. S. Cavers and K. Meagher), Journal of Combinatorial Designs **19** (2011), 378–406.
- *On the metric dimension of Grassmann graphs* (with K. Meagher), Discrete Mathematics and Theoretical Computer Science **13:4** (2011), 97–104.

Papers accepted for publication in refereed journals

- *Decoding generalised hyperoctahedral groups and asymptotic analysis of correctible error patterns* (with T. Prellberg), to appear in Contributions to Discrete Mathematics; arXiv:0807.0410.
- *Generalized packing designs* (with A. C. Burgess), to appear in Discrete Mathematics; arXiv:1107.4120.

Papers in preparation

- *On packing spanning trees in graphs and bases in matroids* (with M. W. Newman and B. Stevens).
- *Resolving sets in Johnson and Kneser graphs* (with J. Cáceres, D. Garijo, A. González, A. Márquez, K. Meagher and M. L. Puertas).
- *On the metric dimension of incidence graphs* (with W. J. Martin).
- *Separation defects and bases*.

Selected talks (since 2006)

- *Some observations about covering arrays and VC-dimension*, Canadian Mathematical Society Winter Meeting 2011 (invited to speak in session on “Designs, Factorizations and Coverings”), 12th December 2011.
- *The metric dimension problem in geometry, algebra and combinatorics*, Algebra seminar, University of Auckland, 1st August 2011.
- *Recent (and not-so-recent) results on metric dimension of distance-regular graphs*, Graphs, Designs and Algebraic Combinatorics, University of Regina, 19th July 2011.
- *Resolving sets for incidence graphs*, 23rd British Combinatorial Conference, University of Exeter, 5th July 2011.
- *Generalized covering designs as hypergraph covers*, CanaDAM 2011, University of Victoria, 3rd June 2011.
- *A matrix method for resolving sets in Johnson graphs*, CanaDAM 2011, University of Victoria, 1st June 2011.
- *Resolving sets for incidence graphs*, Ottawa–Carleton Discrete Mathematics Days, University of Ottawa, 13th May 2011.
- *A matrix method for resolving sets in Johnson graphs*, Ontario Combinatorics Workshop, Ryerson University, 7th May 2011.
- *The metric dimension problem in geometry, combinatorics and algebra*, Prairie Network for Research in the Mathematical Sciences, University of Regina, 30th April 2011.
- *Generalized covering and packing designs*, Canadian Mathematical Society Winter Meeting 2010 (invited to speak in session on “Theory and applications of sequences and arrays”), 4th December 2010.
- *Generalized covering designs*, Combinatorics 2010 (Verbania, Italy), 28th June 2010.
- *Generalized covering designs and clique coverings*, Combinatorics Study Group, Queen Mary University of London, 4th June 2010.
- *Generalized covering designs and clique coverings*, Ottawa–Carleton Discrete Mathematics Days, Carleton University, 15th May 2010.
- *Metric dimension of distance-regular graphs*, Groups, Combinatorics, Algorithms and Complexity 2010, Ohio State University, 24th March 2010.
- *Hamiltonian decompositions of complete k -uniform hypergraphs*, Combinatorics Seminar, Memorial University of Newfoundland, St. John’s, 15th February 2010.
- *Metric dimension of graphs, and group theory*, Department of Mathematics and Statistics Seminar, University of Winnipeg, 2nd November 2009.
- *Metric dimension of distance-regular graphs*, 22nd British Combinatorial Conference, University of St Andrews, 6th July 2009.
- *Metric dimension of distance-regular graphs*, Canadian Mathematical Society Summer Meeting 2009 (invited to speak in session on “Algebraic Combinatorics”), Memorial University of Newfoundland, 7th June 2009.
- *On packing bases in matroids*, CanaDAM 2009, Université de Montréal, 28th May 2009.
- *Base sizes of automorphism groups of graphs*, Ottawa–Carleton Discrete Mathematics Days, University of Ottawa, 23rd May 2009.
- *Base size, metric dimension and other stories*, special session on “Algebraic Graph Theory, Association Schemes and Related Topics”, American Mathematical Society Sectional Meeting, Worcester Polytechnic Institute, 26th April 2009.
- *Base size, metric dimension and other stories*, Department of Mathematics and Statistics Colloquium, University of Regina, 20th February 2009.

- *On packing spanning trees in graphs and bases in matroids*, Discrete Mathematics Seminar, Simon Fraser University, 10th February 2009.
- *On packing spanning trees in graphs and bases in matroids*, Portland Area Lecture Series on Combinatorics, Portland State University, 4th February 2009.
- *Base size, metric dimension and other stories*, Two-day Workshop on Algebra, University of Auckland, 29th January 2009.
- *On packing spanning trees in graphs and bases in matroids*, Pure Mathematics Seminar, University of New South Wales, 20th January 2009.
- *Separation defects, bases and the single-orbit conjecture*, Groups, Combinatorics and Computation 2009, University of Western Australia, 8th January 2009.
- *Distance enumerators for permutation groups*, Canadian Mathematical Society Winter Meeting 2008 (invited to speak in session on “Cryptography and Coding Theory”), 6th December 2008.
- *Hamiltonian decompositions of complete k -uniform hypergraphs*, Combinatorics 2008 (Costermano, Italy), 23rd June 2008.
- *Hamiltonian decompositions of complete k -uniform hypergraphs*, Ontario Combinatorics Workshop, University of Waterloo, 23rd May 2008.
- *Uncoverings-by-bases for graphic matroids*, Ottawa–Carleton Graph Theory Workshop, Carleton University, 11th May 2008.
- *Permutation groups, codes and the single-orbit conjecture*, Combinatorics Seminar, California Institute of Technology, 17th April 2008.
- *On the single-orbit conjecture for uncoverings-by-bases*, Ottawa–Carleton Algebra Seminar, Carleton University, 23rd October 2007.
- *Uncoverings-by-bases for graphic matroids*, 21st British Combinatorial Conference, University of Reading, 12th July 2007.
- *Distance enumerators for permutation groups*, Pure Mathematics Seminar, Queen Mary, University of London, 6th November 2006.
- *Uncoverings-by-bases for groups and matroids*, Fields Institute Workshop on Covering Arrays, Carleton University, 16th May 2006.
- *Error-correcting codes from permutation groups*, Ottawa–Carleton Discrete Mathematics Day, Carleton University, 12th May 2006.
- Numerous presentations in departmental seminars, colloquia, study groups, etc.
- *Forthcoming talks at: G@R, Ryerson University (February 2012); Canadian Mathematical Society Summer Meeting 2012, Regina (June 2012); SIAM Conference on Discrete Mathematics, Halifax (June 2012).*

A full list of talks is available from www.math.uregina.ca/~bailey/talks/.

Grants and awards

- 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.

Teaching Experience

At the University of Regina:

- Lecturer for course Math122 *Linear Algebra I*, January–April 2012, January–April 2010 and September–December 2009.
- Instructor for reading course Math890AL *Permutation Groups*, January–April 2012.
- Lecturer for course Stat100 *Elementary Statistics for Applications*, September–December 2011 and September–December 2010.
- Lecturer for cross-listed courses Math828 *Advanced Combinatorics* and Math890AL *Permutation Groups*, January–April 2011.

At Carleton University:

- Lecturer for course MATH2107 *Linear Algebra II*, May–August 2009.
- Lecturer for course MATH1009 *Calculus for Business and Economics*, September–December 2008 and May–August 2008 (co-lecturer).
- Lecturer for course MATH3107 *Linear Algebra III*, January–April 2008.

At Queen Mary, University of London:

- Lecturer for course SEJ015 *Discrete Mathematics* (for foundation programme students), April–June 2006 and April–June 2007.
- Substitute lecturer for course MAS201 *Algebraic Structures I*, March 2006.
- Supplementary lectures for course MAS108 *Probability I*, November–December 2006.
- Tutorials for M.Sc. course MTHM036 *Permutation Groups*, January–March 2007.

Other Activities

Administration

Course Administrator for MAS115 *Calculus I* and MAS125 *Calculus II*, 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.

Organisation

Co-organiser of *Graphs, Designs and Algebraic Combinatorics*, University of Regina, 18th–21st July 2011, and *Prairie Discrete Mathematics Workshop 2011*, University of Regina, 22nd–23rd July 2011.

Co-organiser of *From Higman–Sims to Urysohn: Peter Cameron's 60th birthday conference*, University of Cumbria, Ambleside, UK, 23rd–26th August 2007.

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

Co-organiser of Ottawa–Carleton Combinatorics & Optimization Seminar, September 2008–April 2009.

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

Professional Service

July 2010: Examiner for M.Sc. thesis of A. Purdy, University of Regina.

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

Memberships

2002–present: London Mathematical Society.

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

Outreach

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.

Peer review

Referee for the following journals:

- *Applicable Analysis and Discrete Mathematics*
- *Ars Combinatoria*
- *The Computer Journal*
- *Discrete Applied Mathematics*
- *Discrete Mathematics*
- *Discrete Mathematics and Theoretical Computer Science*
- *Electronic Journal of Combinatorics*
- *European Journal of Combinatorics*
- *Graphs and Combinatorics*
- *IEEE Transactions on Information Theory*
- *Information Processing Letters*
- *Journal of Combinatorial Theory: Series A*

Reviewer for *Mathematical Reviews*.

Referees

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