Sergi Elizalde

Office Tel: 603-646-8191
Dept Fax: 603-646-1312
sergi.elizalde<at>dartmouth.edu
http://www.math.dartmouth.edu/~sergi

Department of Mathematics
Dartmouth College
6188 Kemeny Hall
Hanover, NH 03755-3551

Research Interests

Enumerative combinatorics: permutations, bijections, pattern avoidance, generating functions, lattice paths; applications to algebra, dynamical systems and computational biology.

Education

Massachusetts Institute of Technology (MIT), Cambridge, MA, 2000-2004.
Ph.D. in Mathematics, June 2004.
Thesis title: *Statistics on Pattern-avoiding Permutations.*
Advisor: Richard Stanley.
GPA: 4.0/4.0.

Universitat Politècnica de Catalunya (UPC), Barcelona, Spain, 1996-2000.
B.S. in Mathematics, June 2000.
Undergraduate advisor: Marc Noy.
Ranked First in Class, with final grade of A with Honors.

Work Experience

Dartmouth College, Hanover, NH, 2013–present.
Associate Professor with tenure.

Dartmouth College, Hanover, NH, 2007–2013.
Assistant Professor.

Dartmouth College, Hanover, NH, 2005–2007.
John Wesley Young Research Instructor.

Centre de Recerca Matemàtica (CRM), Spain, winter 2007.
Postdoctoral Fellow in the program *Enumerative Combinatorics and Random Structures.*

Institut Mittag-Leffler, Sweden, spring 2005.
Postdoctoral Fellow in the program *Algebraic Combinatorics.*

Mathematical Sciences Research Institute (MSRI), Berkeley, CA, 2004-2005.
Postdoctoral Fellow. Member of the programs *Hyperplane Arrangements and Applications*, Fall 2004, and *Probability, Algorithms, and Statistical Physics*, Spring 2005.

Publications

Arc permutations (with Y. Roichman), *J. Algebraic Combin.*, to appear.

Inversion polynomials for 321-avoiding permutations (with S.-E. Cheng, A. Kasraoui and B. Sagan), *Discrete Math.* 313 (2013), 2552–2565.

Pattern avoidance in matchings and partitions (with J. Bloom), *Electron. J. Combin.* 20 (2013), #P5.

The most and the least avoided consecutive patterns, *Proc. Lond. Math. Soc.* 106 (2013), 957–979.

Total occurrence statistics on restricted permutations (with A. Burstein), Pure Math. Appl. (PU.M.A.), to appear.

Periodic patterns of signed shifts (with K. Archer), *Discrete Math. Theor. Comput. Sci. proc. AS* (2013), 873–884.

Patterns in matchings and rook placements (with J. Bloom), *Discrete Math. Theor. Comput. Sci. proc. AS* (2013), 909–920.

Clusters, generating functions and asymptotics for consecutive patterns in permutations (with M. Noy), *Adv. in Appl. Math.* 49 (2012), 351–374.

Bijections for lattice paths between two boundaries (with M. Rubey), *Discrete Math. Theor. Comput. Sci. proc. AR* (2012), 827–838.

Generating trees for partitions and permutations with no k-nestings (with S. Burrill, M. Mishna, L. Yen), *Discrete Math. Theor. Comput. Sci. proc. AR* (2012), 409–420.

Arc Permutations (extended abstract) (with Y. Roichman), *Discrete Math. Theor. Comput. Sci. proc. AR* (2012), 259–270.

Fixed points and excedances in restricted permutations, *Electron. J. Combin.* 18 (2012), #P29.

Consecutive patterns in permutations: clusters and generating functions (with M. Noy), *Discrete Math. Theor. Comput. Sci. proc. AR* (2012), 247–258.

Permutations and β-shifts, *J. Combin. Theory Ser. A* 118 (2011), 2474–2497.

Allowed patterns of β-shifts, *Discrete Math. Theor. Comput. Sci. proc. AO* (2011), 293–304.

Descent sets of cyclic permutations, *Adv. in Appl. Math.* 47 (2011), 688–709.

Restricted simsun permutations (with E. Deutsch), *Ann. Comb.* 16 (2012), 253–269.

On basic forbidden patterns of functions (with Y. Liu), *Discrete Appl. Math.* 159 (2011), 1207–1216.

Cycle-up-down permutations (with E. Deutsch), *Australas. J. Combin.* 50 (2011), 187–199.

The X-class and almost-increasing permutations, *Ann. Comb.* 15 (2011), 51–68.

Improved bounds on the number of numerical semigroups of a given genus, *J. Pure Appl. Algebra* 214 (2010), 1862–1873.

The largest and the smallest fixed points of permutations (with E. Deutsch), *European J. Combin.* 31 (2010), 1404–1409.

Permutations realized by shifts, *Discrete Math. Theor. Comput. Sci. proc. AK* (2009), 361–372.

The number of permutations realized by a shift, *SIAM J. Discrete Math.* 23 (2009), 765–786.

Sorting by Placement and Shift (with P. Winkler), *Proceedings of the Twentieth Annual ACM-SIAM Symposium on Discrete Algorithms, SODA* 2009.

Pattern avoidance in dynamical systems (with J.M. Amigó, M.B. Kennel), *Discrete Math. Theor. Comput. Sci. proc. AJ* (2008), 71–82.

Forbidden patterns and shift systems (with J.M. Amigó, M.B. Kennel), *J. Combin. Theory Ser. A* 115 (2008), 485–504.

Generating trees for permutations avoiding generalized patterns, *Ann. Comb.* 11 (2007), 435–458.

A bijection between 2-triangulations and pairs of non-crossing Dyck paths, *J. Combin. Theory Ser. A* 114/8 (2007), 1481–1503.

Bounds on the number of inference functions of a graphical model (with K. Woods), *Statist. Sinica* 17 (2007), 1395–1415.

The probability of choosing primitive sets (with K. Woods), *J. Number Theory* 125 (2007), 39–49.

Restricted Dumont permutations, Dyck paths, and noncrossing partitions (with A. Burstein and T. Mansour), *Discrete Math.* 306 (2006), 2851–2869.

Combinatòria i biologia: funcions d'inferència i alineació de seqüències, *Butl. Soc. Catalana Mat.* 21 (2006), n. 1, 39–52.

Asymptotic enumeration of permutations avoiding generalized patterns, *Adv. in Appl. Math.* 36 (2006), 138–155.

Inference functions. Chapter of the book *Algebraic Statistics for Computational Biology*, edited by L. Pachter and B. Sturmfels, Cambridge University Press, 2005.

Bounds for optimal sequence alignment (with F. Lam). Chapter of the book *Algebraic Statistics for Computational Biology*, edited by L. Pachter and B. Sturmfels, Cambridge University Press, 2005.

Old and young leaves on plane trees (with W.Y.C. Chen and E. Deutsch), *European J. Combin.* 27 (2006), Issue 3, 414–427.

Multiple pattern-avoidance with respect to fixed points and excedances, *Electron. J. Combin.* 11 (2004), #R51.

Restricted Motzkin permutations, Motzkin paths, continued fractions, and Chebyshev polynomials (with T. Mansour), *Discrete Math.* 305 (2005), 170–189.

A simple and unusual bijection for Dyck paths and its consequences (with E. Deutsch), *Ann. Comb.* 7 (2003), 281–297.

Bijections for refined restricted permutations (with I. Pak), *J. Combin. Theory Ser. A* 105 (2004), 207–219.

Consecutive patterns in permutations (with M. Noy), *Adv. in Appl. Math.* 30 (2003), 110–125.

Games and Invariants. Chapter of the book *Training Sessions for the International Mathematical Olympiad* (in Catalan), Catalan Mathematical Society, Barcelona, 2000.

Selected Presentations

Oberwolfach workshop on Enumerative Combinatorics, Germany, Mar. 2014 (invited).

Mathematical Congress of the Americas, Guanajuato, Mexico, Aug. 2013, special session in Applied Combinatorics.

Plenary speaker, 11th International Conference on Permutation Patterns, PP 2013, Paris, Jul. 2013.

International conference on Formal Power Series and Algebraic Combinatorics:
FPSAC 2011, FPSAC 2008, FPSAC 2007, FPSAC 2006, FPSAC 2003 (talks);
FPSAC 2013, FPSAC 2012, FPSAC 2009, FPSAC 2005, FPSAC 2004, FPSAC 2001 (posters).

CanaDAM, mini-symposium on Enumerative Combinatorics, Newfoundland, Jun. 2013 (invited).

Queen Mary, University of London, Workshop on Combinatorial Probability and Statistical Mechanics, London, Feb. 2013 (invited).

AMS-MAA Joint Mathematics Meetings, special session on Patterns in permutations and words, San Diego, Jan. 2013 (invited).

Colby College Mathematics & Statistics Colloquium, Oct. 2012.

AMS Eastern Section Meeting, Rochester, NY, Sep. 2012 (invited).

SIAM Conference on Discrete Mathematics, mini-symposium on Algebraic Combinatorics, Halifax, Canada, Jun. 2012 (invited).

Plenary speaker at CombinaTexas, Georgetown, TX, Apr. 2012.

University of Florida Mathematics Colloquium, Feb. 2012.

University of Miami Combinatorics Seminar, Feb. 2012.

Dartmouth College Combinatorics Seminar, Sep. 2011, Oct. 2010, Jan. 2010, Apr. 2009, Jan. 2009.

University of Pennsylvania Combinatorics Seminar, Apr. 2011.

University of British Columbia Discrete Maths Seminar, Apr. 2011.

Pacific Permutation Patterns Workshop, SFU, Mar.-Apr. 2011 (invited).

Simon Fraser University Discrete Maths Seminar, Mar. 2011.

AMS Fall Eastern Section Meeting, Oct. 2010 (invited).
SIAM Conference on Discrete Mathematics, mini-symposium on Enumerative Combinatorics, Jun. 2010 (invited).
Conference in Honor of Doron Zeilberger's 60th Birthday, Rutgers University, May 2010.
Howard University Mathematics Colloquium, May 2010, Feb. 2007.
JHU Center for Talented Youth, Keynote address, May 2010.
LaCIM Séminaire, UQAM, Apr. 2010.
MIT Combinatorics Seminar, Mar. 2010, Sep. 2006, Feb. 2005, Nov. 2003.
Rutgers University Experimental Mathematics Seminar, Feb. 2010.
AMS Fall Southeastern Meeting, Oct. 2009 (invited).
AMS Fall Eastern Section Meeting, Oct. 2009 (invited).
University of Hawaii Mathematics Colloquium, Oct. 2009.
23rd Midwest Conference on Combinatorics, Cryptography, and Computing, Oct. 2009 (invited).
International conference on Permutation Patterns: PP 2009, PP 2008, PP 2006, PP 2005, PP 2004.
SIAM Symposium on Discrete Algorithms, SODA, Jan. 2009.
Universitat Politècnica de Catalunya, Seminar in non-linear dynamics, Dec. 2008.
University of Washington Combinatorics Seminar, Oct. 2008.
Jornadas de Matemática Discreta y Algorítmica, Spain, July 2008.
George Washington University Combinatorics Seminar, May 2008.
AMS Fall Central Section Meeting, De Paul University, Oct. 2007 (invited).
Discrete Mathematics Day of the Northeast, Middlebury College, Sep. 2007.
Coloquio Latinoamericano de Álgebra, Colombia, Jul. 2007 (invited).
Conference on Enumeration and Probabilistic Methods in Combinatorics, CRM, Spain, Jun. 2007.
University of Denver Mathematics Colloquium, Feb. 2007.
University of Colorado at Boulder Mathematics Colloquium, Feb. 2007.
UQAM Mathematics Colloquium, Feb. 2007.
University of Vermont Mathematics Colloquium, Feb. 2007.
Dartmouth College Mathematics Colloquium, Jan. 2007.
University of South Carolina Mathematics Colloquium, Jan. 2007.
University of Kentucky Mathematics Colloquium, Jan. 2007.
Centre de Recerca Matemàtica Seminar, Dec. 2006.
Wesleyan University, Algebra and Topology Seminar, Dec. 2006.
University of Vermont, Combinatorics Seminar, Nov. 2006.
AMS Fall Southeastern Meeting, Nov. 2006 (invited).
AMS Fall Eastern Meeting, Oct. 2006 (invited).
International Congress of Mathematicians (ICM), Madrid, Aug. 2006.
York University, Applied Algebra Seminar, Mar. 2006, Jan. 2004.
San Francisco State University Algebra-Geometry-Combinatorics Seminar, Jan. 2006.
U.C. Berkeley Combinatorics Seminar, Jan. 2006, Feb. 2004.
Dartmouth College Mathematics Colloquium, Jan. 2006.
Joint meeting AMS - German Math. Soc. - Austrian Math. Soc., Germany, Jun. 2005 (invited).
Institut Mittag-Leffler Seminar, Sweden, May 2005.
MSRI Post-doc Seminar, Apr. 2005, Nov 2004.
Bay Area Discrete Mathematics Day, San Jose State University, Apr. 2005.
Algebraic Statistics in Computational Biology Seminar, U.C. Berkeley, Feb. 2005, Nov. 2004.
University of Central Florida, Mathematics Department Colloquium, Jan. 2005.

Stanford University Representation Theory and Algebra Seminar, Dec. 2004.

U.C. San Diego Combinatorics Seminar, Oct. 2004.

University of Michigan Combinatorics Seminar, Oct. 2004.

U.C. Davis Discrete Mathematics and Representation Theory Seminar, Oct. 2004.

Joint International Meeting RSME-AMS, Spain, Jun. 2003 (invited).

UPC Seminar of Graph Theory, Combinatorics and Applications, Jun. 2000.

Awards and Fellowships

National Security Agency Young Investigation Grant, *Consecutive patterns in permutations: enumeration, variations, and applications*, Feb 2014–Feb. 2015, PI, $20,000.

Simons Foundation Collaboration Grant for Mathematicians, *Patterns in permutations and dynamical systems*, Sep. 2013–Aug. 2018, PI, $35,000.

Susan and Gib Myers 1964 Faculty Fellowship, 2013–2014.

Karen E. Wetterhahn Memorial Award for Distinguished Creative or Scholarly Achievement, 2013–2014.

National Science Foundation Individual Grant DMS-1001046, *Pattern avoidance in dynamical systems*, Program in Algebra, Number Theory and Combinatorics, Jul. 2010–Jun. 2013, PI, $150,000.

National Science Foundation Grant to organize the Conference on Permutation Patterns 2010, PI, $14,460.

Junior Faculty Fellowship, Dartmouth College, 2010-2011.

Burke Research Initiation Award for Junior Faculty, Dartmouth College, 2007.

Beatriu de Pinós Postdoctoral Fellowship, Spain, 2007.

J. William Fulbright Association of Spanish Fulbright Alumni Fellowship, 2006.

Ph.D. Thesis Extraordinary Award, Universitat Politècnica de Catalunya (UPC), Barcelona, 2006.

Clay Mathematics Institute affiliate scholar, 2004-2006.

Institut Mittag-Leffler Postdoctoral Fellowhsip, Sweden, spring 2005.

Mathematical Sciences Research Institute Postdoctoral Fellowship, fall 2004 and spring 2005.

MAE Fellowship to study abroad, Spanish Ministry of Foreign Affairs, 2002-2003 and 2003-2004.

Second National Graduation Award in Mathematics, Ministry for Education, Spain, 2001.

"La Caixa" Foundation Fellowship, awarded by His Majesty Juan Carlos I, King of Spain, 2000.

Initiation in Research Fellowship, Higher Council of Scientific Research (CSIC, Spain), 2000.

Collaboration Fellowship from the Ministry of Education and Culture, UPC, Spain, 1999.

Silver Medal 1997, *Bronze Medal* 1996, Iberoamerican Mathematical Olympiad.

Record high score 1997, *Winner and Gold Medal* 1996, Spanish Mathematical Olympiad.

Honorable Mention, International Mathematical Olympiad, Bombay, India, 1996.

Gold Medal, Spanish Physics Olympiad, 1996.

Professional Activities

Member of the **Organizing Committee** of FPSAC 2016, Vancouver.

Member of the **Program Committee** of FPSAC 2014, Chicago, and FPSAC 2010, San Francisco.

Member of the **Steering Committee** of Discrete Math Days of the Northeast, 2011-present.

Co-organizer of a special session at the Mathematical Congress of the Americas, Mexico, 2013.

Guest editor of the special issue of the journal Pure Mathematics and Applications (PuMA)

devoted to the Proceedings of the conference Permutation Patterns, 2011.

Main organizer of the Eighth International Conference on Permutation Patterns, Dartmouth College, Aug. 9-13, 2010, with over 70 participants.

Main organizer of the weekly *Dartmouth Combinatorics Seminar*, 2007-present.

Co-organizer of the conference *Discrete Mathematics Day of the Northeast*, Dartmouth College, Oct. 2007, with over 50 participants.

Co-organizer of the conference *Mechanical Puzzles Day*, Dartmouth College, Feb. 2008, with over 100 participants.

Member of the Undergraduate Program Committee, Dartmouth Math Dept., 2010-2011.

Member of the Graduate Admissions Committee, Dartmouth Math Dept., 2008-2010.

Referee for 34 journals and conferences: *Advances in Applied Mathematics*; *American Mathematical Monthly*; *Analysis of Algorithms*; *Annals of Combinatorics*; *Australasian Journal of Combinatorics*; *Discrete Applied Mathematics*; *Discrete Mathematics*; *Discrete Mathematics and Theoretical Computer Science*; *Electronic Journal of Combinatorics*; *EuroComb*; *European Journal of Combinatorics*; *Experimental Mathematics*; *Formal Power Series and Algebraic Combinatorics*; *Information Processing Letters*; *Integers: Electronic Journal of Combinatorial Number Theory*; *Journal of Algebraic Combinatorics*; *Journal of Combinatorial Theory Series A*; *Journal of Combinatorics*; *Journal of Integer Sequences*; *Journal of Mathematical Psychology*; *Journal of Pure and Applied Algebra*; *LMS Lecture Notes Series*; *Memorias Congreso Internacional Fibonacci*; *Online journal of analytic combinatorics*; *Order*; *Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms*; *Proceedings of the AMS*; *Pure and Applied Mathematics*; *Pure Mathematics and Applications*; *Séminaire Lotharingien de Combinatoire*; *SIAM Journal on Discrete Mathematics*; *SIAM Symposium on Discrete Algorithms (SODA)*; *Theoretical Computer Science*; *World Scientific Publishing Co.*
Reviewer for *NSERC* grant applications and for *Mathematical Reviews*.

Problem Coordinator, International Mathematical Olympiad, Madrid, 2008.

President of *Xarxa FME*, the Association of Alumni and Friends of the Facultat de Matemàtiques i Estadística of the Universitat Politècnica de Catalunya, 2005-present.

President of *Iberia*, the Association of Spanish people in the Boston area, with over 400 members, 2003-2004.

Teaching and advising

Supervisor of four **Ph.D. students** (Kassie Archer, Jonathan Bloom, Tim Dwyer, Megan Martinez), and the following undergraduate students:

- Sean Griffin, *Pancyclic graphs*, Neukom Institute Fellowship, 2012-13.
- Elaine Levey, *Forbidden patterns in financial series*, Presidential Scholarship, 2011-12.
- Yangyang Liu, *On basic forbidden patterns of functions*, Senior Thesis, 2008-09.
- Alexander Borland, *Allowed patterns of β-shifts*, Presidential Scholarship, 2008-09.
- Emily Chang, *Forbidden patterns of the Collatz sequence*, Women in Science Project, 2008-09.
- Vlad Dobru, *Combinatorics of the logistic map*, Presidential Scholarship, 2008-09.
- Will Chen, *The Fibonacci conjecture on numerical semigroups*, 2009.

Instructor of the following courses at Dartmouth College:

- Fall 2013: *Calculus Plus*; *Algebraic Combinatorics*.
- Spring 2013: *Multivariable Calculus*; *Combinatorics* (graduate course).
- Winter 2013: *An Introduction to Math Beyond Calculus*.
- Spring 2012: *Current problems in Combinatorics* (graduate course); *Multivariable Calculus*.
- Fall 2011: *Algebraic Combinatorics*.

- Winter 2011: *Combinatorics* (graduate course); *Introduction to Combinatorics*.
- Spring 2010: *Graph Theory*.
- Winter 2010: *Introduction to Combinatorics*; *Abstract Algebra*.
- Winter 2009: *Abstract Algebra*.
- Fall 2008: *Introduction to Calculus*; *Topics in Algebra* (graduate course).
- Winter 2008: *The Probabilistic Method* (graduate course).
- Fall 2007: *Algebraic Combinatorics*.
- Spring 2007: *Graph Theory*.
- Fall 2006: *Topics in Combinatorics* (graduate course); *Multivariable Calculus*.
- Summer 2006: *Discrete Probability*.
- Spring 2006: *Graph Theory*; *Linear Programming*.
- Fall 2005: *Introduction to Calculus*; *Algebraic Combinatorics*.

Coach of the Dartmouth Putnam team, 2008-present.

Deputy leader of the Spanish Team in the Iberoamerican Math Olympiad, Colombia, 2005.

Recitation Instructor in *Theory of Computation*, MIT, fall 2002 and fall 2003.

Academy Fellow for the *Clay Mathematics Research Academy*, Clay Mathematics Institute, Cambridge, MA, 2003, 2004 and 2005.

Active Learning Institute, Dartmouth Center for the Advancement of Learning, 2012.

Microteaching Workshop, MIT, 2002.

Instructor in the training sessions of the Spanish team for the IMO, 1999, 2000, 2001 and 2003.

Additional Studies

Languages spoken: Spanish, Catalan, English; French, German, Italian.

Music Studies: Professional Conservatory of Music of Terrassa, Spain, 1990-2000. Title of *Professor of Piano, Professional Degree*, June 2000.