

Sebastian M. Cioabă January 18, 2012

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RESEARCH INTERESTS

Graph Theory, Combinatorics, Algebra, Computer Science.

ACADEMIC POSITIONS

Tenure-Track Assistant Professor, University of Delaware
January 16, 2009 - present.

Postdoctoral Fellow, University of Toronto.
July, 2008-December, 2008.
Mentor: Mike Molloy.

Postdoctoral Fellow, University of California, San Diego.
February, 2006-June, 2008.
Mentor: Fan Chung.

Postdoctoral Fellow, Queen's University at Kingston, Ontario, Canada.
January, 2006.
Mentors: David Gregory, Ram Murty, David Wehlau.

EDUCATION

2006, Ph.D. Mathematics, Queen's University at Kingston, Ontario, Canada.
Advisors: David Gregory, Ram Murty, David Wehlau.
Thesis *Eigenvalues, Expanders and Gaps between Primes*.

2002, M.Sc. Mathematics, Queen's University at Kingston, Ontario, Canada
Advisor: Dominique de Caen.
Thesis *The NP-Completeness of some Edge-Partitioning Problems*.

2000, B.Sc. Mathematics and Computer Science, University of Bucharest, Romania.
Advisor: Ioan Tomescu.
Thesis *Chromatic Polynomials*.

BOOKS

1. *A First Course in Graph Theory and Combinatorics*.
186 pages book, Hindustan Book Agency, TRIM Series, (2009).
With Ram Murty.

BOOK CHAPTERS

1. *Some applications of eigenvalues of graphs*.
Chapter in **Structural Analysis of Complex Networks: Theory and Applications** 357–381, Editor: Matthias Dehmer, Birkhauser Publishing USA (2011).

PAPERS

1. *Skew-adjacency matrices of graphs*
accepted to **Linear Algebra and its Applications**
28 pages, with Michael Cavers, Shaun Fallat, David Gregory, Willem Haemers,
Steve Kirkland, Judy McDonald and Michael Tsatsomeros.

2. *On a conjecture of Brouwer involving the connectivity of strongly regular graphs*
Journal of Combinatorial Theory, Series A, 119, 904–922, (2012).
With Jack Koolen and Kijung Kim.
3. *Covering complete hypergraphs with cuts of minimal total size.*
Graphs and Combinatorics, 28, Number 1, 109–122, (2012).
With André Kündgen.
4. *More counterexamples to the Alon-Saks-Seymour and the Rank-Coloring Conjectures*
The Electronic Journal of Combinatorics, P26, 1–9, (2011).
With Michael Tait.
5. *Covering complete r -graphs with spanning complete r -partite r -graphs*
Combinatorics, Probability and Computing, 20, 519–527, (2011).
With André Kündgen, Craig Timmons and Vladislav Vysotsky.
6. *Edge-connectivity, eigenvalues and matchings in regular graphs.*
SIAM Journal of Discrete Mathematics, 24, 1470–1481, (2010).
With Suil O.
7. *A necessary and sufficient eigenvector condition for a graph to be bipartite.*
Electronic Journal of Linear Algebra, 20, 351–353, (2010).
8. *A lower bound for the spectral radius of graphs with fixed diameter.*
European Journal of Combinatorics, 31 (6), 1560–1566, (2010).
With Edwin van Dam, Jack Koolen and Jae-Ho Lee.
9. *Asymptotic results on the spectral radius and the diameter of graphs.*
Linear Algebra and its Applications, 432, 722–737, (2010).
With Edwin van Dam, Jack Koolen and Jae-Ho Lee.
10. *Eigenvalues and edge-connectivity of regular graphs.*
Linear Algebra and its Applications, 432, 458–470, (2010).
11. *On decompositions of complete hypergraphs.*
Journal of Combinatorial Theory, Series A, 116, 1232–1234, (2009).
With André Kündgen and Jacques Verstraëte.
Most Downloaded paper in JCTA between April 2009 and June 2009.
12. *Matchings in regular graphs from eigenvalues.*
Journal of Combinatorial Theory, Series B, 99, 287–297, (2009).
With David Gregory and Willem Haemers.
Most Downloaded paper in JCTB between October 2008 and March 2009.
13. *Expander graphs and gaps between primes.*
Forum Mathematicum, 20, Issue 4, 745–756, (2008).
With Ram Murty.
14. *The minimum degree distance of a graph with given order and size.*
Discrete Applied Mathematics, 156, Issue 18, 3518–3521, (2008).
With Orest Bucicovschi.
15. *Zero forcing sets and the minimum rank of graphs.*
Linear Algebra and its Applications, 428, Issue 7, 1628–1648, (2008).
AIM minimum rank - special graphs work group, with 18 co-authors.
16. *Spectral densest subgraph and independence number of a graph.*
Journal of Universal Computer Science, 13, Issue 11, 1501–1513, (2007).
With Reid Andersen.
17. *Principal eigenvectors for irregular graphs.*
Electronic Journal of Linear Algebra, 16, 366–379, (2007).
With David Gregory.

18. *The spectral radius and the maximum degree of irregular graphs.*
The Electronic Journal of Combinatorics, 14, 1-10, (2007).
19. *Extreme eigenvalues of nonregular graphs.*
Journal of Combinatorial Theory, Series B, 97, 483-486, (2007).
With David Gregory and Vladimir Nikiforov.
20. *Large matchings from eigenvalues.*
Linear Algebra and its Applications, 422, 308-317, (2007).
With David Gregory.
21. *Sums of powers of the degrees of a graph.*
Discrete Mathematics, 306 (16), 1959-1965, (2006).
22. *Eigenvalues of graphs and a simple proof of a theorem of Greenberg.*
Linear Algebra and its Applications, 416, 776-782, (2006).
23. *On the extreme eigenvalues of regular graphs.*
Journal of Combinatorial Theory, Series B, 96 (3), 367-373, (2006).
24. *Closed walks and eigenvalues of Abelian Cayley graphs.*
C.R.Acad.Sci.Paris Ser.I Math, Volume 342 (9), 635-638, (2006).
25. *Perfect matchings, eigenvalues and expansion.*
C.R.Math.Rep.Acad.Sci.Canada, Vol. 27 (4), 101-104, (2005).
26. *Bounds on the Turán density of $\text{PG}(3, 2)$.*
The Electronic Journal of Combinatorics, 11, 1-7, (2004).

PAPERS
SUBMITTED

1. *Variations on a theme of Graham and Pollak*
submitted to **Discrete Mathematics**, September 12, 2011.
18 pages, with Michael Tait.
2. *Ramanujan Graphs*
submitted Chapter to **Handbook of Finite Fields**, Eds: Gary Mullen and Daniel Panario, October 12, 2011.
28 pages, with M. Ram Murty.
3. *Edge-disjoint spanning trees and eigenvalues of regular graphs*
submitted to **Linear Algebra and its Applications**, November 25, 2011.
19 pages, with Wiseley Wong.

PROBLEMS

1. Problem #11066, **American Mathematical Monthly**, 111, vol.2, p.166, (2004).

STUDENTS
SUPERVISION

- Ph.D. Students: Wiseley Wong, started working with me in Spring 2010; expected graduation date 2013; Weiqiang Li, started working with me in Fall 2011.
- M.Sc. Student: Michael Tait, 2010-2011;
defended his thesis successfully on April 20, 2011
has begun a Ph.D. in Fall 2011 at the University of California, San Diego.
- Graduate Summer Research: Jason Vermette (Gems 2011), Michael Tait (Unidel 2011), Mary Ann Korch (Gems 2010), Giovanna Fiorentino (Unidel 2010), Fatih Say (Unidel 2010), Rui Fang (Gems 2010, co-supervised with Lou Rossi).
- Undergraduate Summer Research: Dajun Lin (Gems 2011), Patrick Devlin (Gems 2010), Michael Tait 2010, Ricky Shum (Gems 2010, co-supervised with Lou Rossi).
- External Ph.D. Examiner: Michael Cavers (University of Regina, Canada) 2010.

- Visiting Student Supervision: Hyeonju Yu (POSTECH, South Korea) June 18-July 1, 2011.
- Member of the Ph.D. Comprehensive Exam Committee for Wiseley Wong, Fan Wu, Alex Kodess, Weiqiang Li, and Chris Castillo.

ORGANIZER

Organizer Discrete Mathematics Seminar.
University of Delaware, 2009-present.

Organizer Student Combinatorics Seminar.
University of Delaware, Summer 2011.

Co-organizer Mini-symposium on Algebraic Graph Theory.
2nd CanADAM Conference, Montreal, Canada, May 25-29, 2009.
With Mike Newman.

Co-organizer Mini-symposium on Eigenvalues of Graphs.
SIAM Discrete Mathematics Conference, University of Vermont, June 15-19, 2008.
With Vladimir Nikiforov.

Co-organizer of a Graph Theory Session, CMS Winter Meeting.
University of Western Ontario, London, Canada, December 8-10, 2007.
With Steve Kirkland and Claude Tardif.

Co-organizer of a Mini-Symposium in Spectral Graph Theory.
1st CanADAM Conference, Banff, Alberta, Canada, May 28-31, 2007.
With Steve Kirkland.

Co-organizer of a Special Session in Graph Theory and Combinatorics.
AMS Meeting #1027, Tucson, Arizona, April 21-22, 2007.
With Joshua Cooper.

Co-organizer of a Reading Course *Harmonic Analysis in Combinatorics and Additive Number Theory*, University of California, San Diego Fall 2006.
With Ross Richardson.

Organizer of the UCSD Combinatorics Seminar, Summer 2006.

Co-organizer of the 13th Ontario Combinatorics Workshop in 2004.
With David Gregory, Lucien Haddad, Claude Tardif and David Wehlau.

AWARDS AND HONORS

2011 Simons Foundation Collaboration Grant (\$35,000 USD).

A selection committee of distinguished scientists will consider the proposals. Awards will be based on the quality of the applicant's previous research and the likely impact that a grant for collaboration and travel would have on future research, both for the applicant and the applicant's students and/or postdocs.

2006 NSERC Postdoctoral Fellowship (\$80,000 CDN).

Awarded by the National Sciences and Engineering Research Council of Canada in recognition of academic excellence, research ability and potential, and leadership and communication skills.

2005 Ontario Graduate Scholarship as international student (\$15,000 CDN).

Competition is open to all research areas and only a percentage of 0.03% is awarded

to international students.

REFEREE

Reviewer for AMS MathSciNet and referee for Linear Algebra and Its Applications; Journal of Combinatorial Theory, Series B.; The Electronic Journal of Combinatorics; SIAM Journal of Discrete Mathematics; Journal of Graph Theory; Discrete Mathematics; Electronic Journal of Linear Algebra; Linear and Multilinear Algebra; Random Structures and Algorithms; Ars Combinatoria; Discrete Applied Mathematics; SIAM Journal on Matrix Analysis and Applications; Australian Journal of Combinatorics; Utilitas Mathematica; Information Processing Letters; Computers and Mathematics with Applications; Journal of Algebra, Number Theory and Applications; International Journal of Mathematics and Mathematical Sciences; Journal of Inequalities in Pure and Applied Mathematics; Bull. Math. Soc. Sci. Math. Roumanie (N.S.); Discrete Optimization; Journal of Combinatorial Optimization; Rocky Mountain Journal; WAW 2011; SODA 2012; European Journal of Combinatorics; Graphs and Combinatorics.

RESEARCH
VISITS

REGS Graduate Student Program.
University of Illinois at Urbana-Champaign, USA, July 2011.
Host: Douglas West.

Microsoft Research Theory.
Redmond, Washington, USA, May 2011.
Host: Alexandra Kolla.

Department of Mathematics.
University of Malta, Malta, May 2011.
Host: Irene Sciriha.

Department of Mathematics.
University of California, San Diego, April 2011.
Host: Jacques Verstraete.

Department of Mathematics.
Pohang Institute of Technology (POSTECH), South Korea, December 2009.
Host: Jack Koolen.

Department of Econometrics and Operations Research.
Tilburg University, The Netherlands, September 2007.
Hosts: Edwin van Dam and Willem Haemers.

TALKS

Rocky Mountain Discrete Mathematics Conference, Laramie, WY, October 2011.
University of Wyoming Colloquium, October 2011.
College of William and Mary Colloquium, October 2011.
University of Memphis, Combinatorics Seminar, October 2011.
PIMS Distinguished Lecture Series, University of Regina, Canada, September 2011.
Virginia Commonwealth University Discrete Mathematics Seminar, September 2011.
Geometric and Algebraic Combinatorics Conference, The Netherlands, August 2011.
REGS Program University of Illinois Urbana-Champaign (4 talks), July 2011.
3rd CanaDAM Conference, Victoria, Canada, June 2011.
Microsoft Research Theory Seminar, Redmond, Washington, May 2011.
SIAM Conference Applications of Dynamical Systems, Snowbird, Utah, May 2011.
University of Malta, Malta (2 talks), May 2011.
Banff Workshop Algebraic Graph Theory, April 2011.
Queen's University, Canada, Number Theory-Combinatorics Seminar, April 2011.

Electrical and Computer Engineering, University of Delaware, April 2011.
University of California, San Diego, Combinatorics Seminar, March 2011.
University of Delaware, Discrete Mathematics Seminar, February 2011.
Drexel University Colloquium, October 2010.
International Linear Algebra Society (ILAS) Meeting, Pisa, Italy, June 2010.
Princeton Discrete Mathematics Seminar, April 2010.
AMS Meeting, Macalaster College, St.Paul, Minnesota, April 2010.
Designs, Codes and Geometry (Gary Ebert's) Conference, March 2010.
Banff Workshop on Ranks of Matrices and Graphs, February 2010.
Penn State Combinatorics Seminar, January 2010.
AMS Joint Meeting, San Francisco, January 2010.
POSTECH Combinatorics Seminar, Pohang, South Korea, December 2009.
AMS-KMS Meeting, Seoul, South Korea, December 2009.
2nd CanADAM Conference, Montreal, May 2009.
AMS Meeting #1050, Worcester Polytechnic Institute, April 2009.
Spectral Graph Theory in Rio Conference, Brazil 2008.
McGill University, Discrete Math Seminar, 2008.
University of Guelph, Colloquium Talk, 2008.
University of Delaware, Discrete Math. Seminar, 2008.
University of Waterloo, Tutte Seminar, 2008.
University of Toronto, Theory/Combinatorics Seminar, 2008.
Queen's University, Colloquium Talk, 2008.
SIAM Discrete Math Conference, University of Vermont, 2008.
California Institute of Technology, Combinatorics Seminar, 2008.
College of Charleston, Colloquium Talk, 2008.
University of Delaware, Colloquium Talk, 2008.
AMS/MAA Joint Mathematics Meeting, San Diego, California, 2008.
CMS Winter Meeting, London, Ontario, Canada, 2007.
AMS Meeting #1030, Central Sectional, Chicago, Illinois, 2007.
Tilburg University, The Netherlands, Colloquium Talk, 2007.
6-th Congress of Romanian Mathematicians, University of Bucharest, Romania, 2007.
1st Canadian Conference in Discrete and Algorithmic Mathematics, Banff, 2007.
STAR Seminar, Dept. of Computer Science, University of California, San Diego, 2007.
AMS Meeting #1027, SW Sectional, Tucson, Arizona, 2007.
University of Ottawa, Canada, Colloquium Talk, 2007.
California Institute of Technology, Combinatorics Seminar, 2007.
California State University at San Marcos, Colloquium Talk, 2006.
University of California, San Diego, Combinatorics Seminar, 2006.
SIAM Discrete Mathematics Conference, University of Victoria, Canada, 2006.
Western Canada Linear Algebra Meeting, University of Victoria, Canada, 2006.
Food for Thought Seminar, University of California, San Diego, 2006.
Queen's University at Kingston, Ontario, Canada, Colloquium Talk, 2005.
University of Waterloo, Canada, Algebraic Graph Theory Seminar, 2005.
12th International Linear Algebra Society Conference, Regina, Canada, 2005.
Brualdi-Fest: University of Wisconsin, Madison, USA, 2005.
Queen's Undergraduate Math Club, Kingston, Ontario, Canada, 2005.
CMS Meeting, McGill University, Montréal, Quebec, Canada, 2004.
13th Ontario Combinatorics Workshop, Kingston, Ontario, Canada, 2004.
AMS Meeting #989, CE+WE Sectional, Boulder, Colorado, USA, 2003.
12th Ontario Combinatorics Workshop, Ottawa, Canada, 2003.
AMS Meeting #985, CE Sectional, Bloomington, Indiana, USA, 2003.
Queen's University - Royal Military College, Discrete Mathematics Seminar, 2002-2006.
Queen's University Number Theory Seminar, 2002-2006.
Colloque Pan-Québécois ISM 2001 des étudiants, McGill University, Canada, 2001.

WORKSHOPS AND
CONFERENCES

Algebraic Graph Theory
BIRS Banff Workshop, Alberta, Canada
April 24-31, 2011.

Linear Algebra Methods in Combinatorics
BIRS Banff Workshop, Alberta, Canada
(Declined Invitation due to the birth of my son) January 31-February 3, 2011.

Theory and Applications of Matrices described by Patterns
BIRS Banff Workshop, Alberta, Canada
January 31-February 5, 2010 .

Invariants of Incidence Matrices
BIRS Banff, Alberta, Canada.
March 29-April 3, 2009.

EXCILL-Extremal Combinatorics at Illinois Conference.
University of Illinois at Urbana-Champaign.
November 2006 - travel grant from organizers.

Workshop on Spectra of Families of Matrices.
American Institute for Mathematics, Palo Alto, California.
October 2006 - travel grant from organizers.

CMI/IAS Workshop on Lie Groups, Representations and Discrete Mathematics.
Institute for Advanced Study, Princeton, New Jersey.
November 2005 - travel grant from organizers.

Workshop on Profinite Groups and Applications, Carleton University, Ottawa.
August 2005 - travel grant from organizers.

CMS Meeting, University of Waterloo, June 2005.

Automorphic Forms, Group Theory and Graph Expansion.
Institute for Pure and Applied Mathematics, UCLA.
February 2004 - travel grant from the organizers.

Advanced Course on Ramsey Methods in Analysis.
Centre de Recerca Matemàtica, Universita Autònoma de Barcelona, Bellaterra.
January 2004 - travel grant from the organizers.

Workshop on Combinatorics, Probability and Algorithms.
Centre de Recherches Mathématiques, Université de Montréal.
May 2003 - travel grant from the organizers.

TEACHING
EXPERIENCE

University of Delaware

- Reading Course Extremal Graph Theory, Fall 2011 (1 student), Math 888 Advanced Course in Spectral and Probabilistic Combinatorics, Spring 2011 (9 students); Math 466 Reading Course in Vector Spaces (1 student); Math 688 Graduate Course Combinatorics, Fall 2010 (4 students); Math 245 Introduction to Proof (22 students); Math 870 Advanced Course in Combinatorics (8 students); Reading Course on Coding Theory, Summer 2010 (1 student); Reading Course on Algebraic and Extremal Graph Theory, Spring 2010 (2 students); Reading Course in Linear Algebra, Spring 2010 (2 students); Math 688 Graduate Course Combinatorics, Spring 2010 (6 students); Math 549 Coding Theory (8 students), Spring 2010; Math 672 Graduate Course Vector Spaces, Fall 2009 (25 students); Math243 Calculus, Spring 2009 (25 students).
- Coach of University of Delaware Putnam Team for Putnam contest 2009, with David Bellamy.

University of California, San Diego

- Instructor, Calculus 20C, Spring 2008 (114 students), Math109, Introduction to Mathematical Reasoning, Winter 2008 (44 students), Calculus 20C, Winter 2008 (216 students), Calculus 20C, Fall 2007 (340 students), Calculus 10B, Spring 2007 (205 students), Calculus 10C, Winter 2007 (272 students), Calculus 10A, Fall 2006 (208 students).

Queen's University at Kingston, Ontario, Canada

- Instructor, Combinatorics 402/802, January 2006, Calculus 126, Summer 2004 and 2003, Winter 2004, 2003 and 2002, Fall 2001, PreCalculus 006, Summer 2002.
- Instructor, $E = mc^2$ Enrichment Program for gifted high school students; designed and taught two one-week courses *Cryptography and Computers*, May 2005.
- Coach of Queen's Undergraduate Team for Putnam contest 2004, with Michael Roth and Ivan Dimitrov.

SERVICE

Advisor for the Undergraduate Math Club.
2010-2011.

Member of the Undergraduate Committee.
2010-2011.

Member Linear Algebra Preliminary Exam Committee.
Winter 2010, 2011, Summer 2010, 2011.

Member of the Colloquium Committee.
University of Delaware, Department of Mathematical Sciences, 2009.

REFERENCES

Professor Richard Brualdi, University of Wisconsin, Madison, USA
608-262-3298 brualdi@math.wisc.edu

Professor Fan Chung Graham, University of California, San Diego, USA
858-534-2848 fan@math.ucsd.edu

Professor Chris Godsil, University of Waterloo, Canada
519-883-5593 cgodsil@uwaterloo.ca

Professor David Gregory, Queen's University at Kingston, Ontario, Canada
613-533-2401 gregoryd@mast.queensu.ca

Professor Willem Haemers, Tilburg University, The Netherlands
+31-134662777 haemers@uvt.nl

Professor Ram Murty, Queen's University at Kingston, Ontario, Canada
613-533-2413 murty@mast.queensu.ca