November 2007

# *CURRICULUM VITAE*

## PERSONAL DATA:

**Name:** **Anthony BONATO**

**Present Position:** *Associate Professor*
Department of Mathematics
Wilfrid Laurier University
Waterloo, ON
Canada, N2L 3C5
*E-mail*: abonato@rogers.com
*Web*: www.wlu.ca/~wwwmath/faculty/bonato

## DEGREES:

| Degree | University | Year | Area |
|---|---|---|---|
| Ph.D. | U. of Waterloo | July 1998 | Logic and Graph Theory |
| M.Math. | U. of Waterloo | December 1994 | Algebra |
| B.Sc. Honours, Summa Cum Laude | McMaster U. | May 1993 | Pure mathematics |

## EMPLOYMENT HISTORY:

| Year | Position | Department | Institution |
|---|---|---|---|
| July 2004 - present | Associate Professor | Math | WLU |
| Nov. 2003 - present | Adjunct Professor | Math & Stats | Dalhousie |
| July 1999 - July 2004 | Assistant Professor | Math | WLU |
| Jan. 2005 - April 2005 | Visiting Member | | Fields Institute |
| May - June 1999 | Postdoctoral Fellow | Math & CS | Mount Allison |
| Sept. 1998 - May 1999 | Assistant Professor, Limited Term | Math & CS | Mount Allison |
| Jan. - April 1998 | Part-time Lecturer | Math | WLU |
| Sept. - Dec. 1997 | Part-time Lecturer | Pure Math | UW |

## AWARDS:

Wilfrid Laurier Merit Award: 2007, 2004, and 2001.

**DOCTORAL STUDENTS SUPERVISED:**

*Fall 03 - Spring 06*: Changping Wang (co-supervised with J. Janssen, Dalhousie U.)

**MASTERS STUDENTS SUPERVISED:**

*September 07 - present*: Noor Hadi
*January 07 - present*: Laleh Samarbakhsh

**POSTDOCTORAL FELLOWS SUPERVISED:**

*Fall 06 - Fall 07*: Changping Wang
*Spring 06*: Pawel Pralat
*Spring 03*: Jing Wang

**RESEARCH FUNDING**:

**External Funding:**

| **Years** | **Source** | **Amount per Year** | **Purpose** |
|---|---|---|---|
| 2005-2010 | NSERC | $12 000 | Research |
| 2007-2008 | MITACS | $17 000 | Research |
| 2006-2007 | MITACS | $20 000 | Research |
| 2005-2006 | MITACS | $5 000 | Research |

**Internal Funding:**

| **Years** | **Type** | **Amount per Year** | **Purpose** |
|---|---|---|---|
| 2007 | Research Fellowship II | $5 000 | Research |
| 2003 | Senior Research Fellowship | $4 490 | Research |
| 2000 | Travel Grant | $2 000 | Travel |

**Other Funding:**

2000-2008: WLU Dean of Science Course Remission

**EXTERNAL REFEREEING**:

*AMS Mathematical Reviews*, *Internet Mathematics*, *Journal of Combinatorial Theory Series B, Random Structures and Algorithms, Graphs and Combinatorics, Discrete Mathematics, Discrete Applied Mathematics, Ars Combinatoria, Atlantic Electronic Journal of Mathematics, Proceedings of WAW07, Proceedings of CAAN07, Proceedings of WAW06, Proceedings of SODA05*, *NSERC Discovery Grant applications.*

**PUBLICATIONS:**

**Books published**

*A Course on the Web Graph*, AMS Graduate Studies in Mathematics Series and AARMS Monograph Series, in press (expected publication date: Spring 2008).

**Books edited**

Bonato, A., F.R.K. Chung, *Proceedings of The 5th Workshop On Algorithms And Models For The Web-Graph*, 2007.

**Published in refereed journals**

1. **Bonato, A.,** A note on uniquely $H$-colorable graphs, *Discussiones Mathematicae Graph Theory* **27** (2007) 39-44.

2. **Bonato, A.**, C. Tardif, Mutually embeddable graphs and the Tree Alternative conjecture, *Journal of Combinatorial Theory, Series B* **96** (2006) 874-880.

3. **Bonato, A.,** Spanning subgraphs of graphs partitioned into two isomorphic pieces, *Journal of Graph Theory* **51** (2006) 123-136.

4. **Bonato, A.**, K. Cameron, On an adjacency property of almost all tournaments, *Discrete Mathematics* **306** (2006) 2327-2335.

5. **Bonato, A.,** A. Costea, Matchings defined by local conditions, *Journal of Combinatorial Mathematics and Combinatorial Computing*. **58** (2006) 41-53.

6. **Bonato, A.**, J. Janssen, Infinite limits of copying models of the web graph, *Internet Mathematics* **1** (2004) 193-213.

7. **Bonato, A.**, D. Delić, A note on orientations of the infinite random graph, *European Journal of Combinatorics* **25** (2004) 921-926.

8. **Bonato, A.**, D. Delić, On a problem of Cameron's on inexhaustible graphs, *Combinatorica* **24** (2004) 35-51.

9. **Bonato, A.**, R. Nowakowski, Partitioning a graph into two isomorphic pieces, *Journal of Graph Theory* **44** (2003) 1-14.

10. C. Baker, **A. Bonato**, J. Brown, Graphs with the 3-e.c. adjacency property constructed from affine planes, *Journal of Combinatorial Mathematics and Combinatorial Computing* **46** (2003) 65-83.

11. **Bonato, A.**, Homomorphisms and amalgamation, *Discrete Mathematics* **270** (2003) 32-41.

12. **Bonato, A.**, C. Tardif, Large families of mutually embeddable vertex-transitive graphs, *Journal of Graph Theory* **43** (2003) 99-106.

13. **Bonato, A.**, P. Cameron, D. Delić, S. Thomassé, Generalized pigeonhole properties of graphs and oriented graphs, *European Journal of Combinatorics* **23** (2002) 257-274.

14. **Bonato, A.** A family of universal pseudo-homogeneous $G$-colourable graphs, *Discrete Mathematics* **247** (2002) 13–23.

15. Baker C., **A. Bonato**, P. Kergin, Skolem arrays and Skolem labellings of ladder graphs, *Ars Combinatoria* **63** (2002) 97-107.

16. **Bonato, A.**, On retracts of the random graph and their natural order, *Monatschefte für Mathematik* **135** (2002) 1-9.

17. **Bonato, A.**, K. Cameron, On 2-e.c. line-critical graphs, *Journal of Combinatorial Mathematics and Combinatorial Computing* **38** (2001) 111–121.

18. **Bonato, A.**, K. Cameron, On an adjacency property of almost all graphs, *Discrete Mathematics* **231** (2001) 103-119.

19. **Bonato, A.**, Wolf Holzmann, and Hadi Kharaghani, Hadamard matrices and strongly regular graphs with the 3-e.c. adjacency property, *Electronic Journal of Combinatorics*, Vol **8** (1), 2001.

20. **Bonato, A.**, Finitely constrained classes closed under unions and $n$-e.c. structures, *Ars Combinatoria* **59** (2001) 181-192.

21. **Bonato, A.**, Metrically universal generic structures in free amalgamation classes, *Mathematical Logic Quarterly* **47** (2001) 147-160.

22. **Bonato, A.**, P. Cameron, D. Delić, Tournaments and orders with the pigeonhole property, *Canadian Mathematical Bulletin* **43** (2000) 397-405.

23. **Bonato, A.**, D. Delić, The monoid of the random graph, *Semigroup Forum* **61** (2000) 138-148.

24. **Bonato, A.**, D. Delić, A pigeonhole principle for relational structures, *Mathematical Logic Quarterly* **45** (1999) 409-413.

25. **Bonato, A.**, Continuum many universal Horn classes of graphs of bounded chromatic number, *Algebra Universalis* **40** (1998) 105-108.

26. **Bonato, A.**, D. Delić, The model companion of width-two orders, *Order* **14** (1998) 87-99.

**Accepted in refereed journals**

1. **Bonato, A.**, J. Janssen, Infinite limits and adjacency properties of a generalized copying model, accepted to *Internet Mathematics*. 25 pages.

2. **Bonato, A.**, D. Delić, I. Dolinka, All countable monoids embed into the monoid of the infinite random graph, submitted to Discrete Applied Mathematics. 5 pages.

3. **Bonato, A.**, G. Hahn, C. Wang, The cop density of a graph, accepted to *Contributions to Discrete Mathematics*. 13 pages.

4. **Bonato, A.**, P. Pralat, The good, the bad, and the great: homomorphisms and cores of random graphs, accepted to *Discrete Mathematics*. 9 pages.

5. Baker, C., **A. Bonato,** J. Brown, T. Szönyi, Graphs with the $n$-e.c. adjacency property constructed from affine planes, accepted to *Discrete Mathematics*. 19 pages. 5 pages.

6. **Bonato, A.**, G. Hahn, P. Golovach, Kratochvil, The search-time of a graph, accepted to *Discrete Mathematics*. 14 pages.

**Published in refereed conference proceedings**

1. **Bonato, A.,** Random graph models for the web graph, invited paper for *Proceedings of 4th National Conference on Mathematical and Computational Models,* 2007.

2. W. Aiello, **A. Bonato**, C. Cooper, J. Janssen, P. Prałat, A spatial web graph model with local influence regions, *Proceedings of The 5th Workshop On Algorithms And Models For The Web-Graph*, 2007.

3. **Bonato, A.**, P. Prałat, C. Wang, Vertex pursuit games in stochastic network models, *Proceedings of Combinatorial and Algorithmic Aspects of Networking*, 2007.

4. **Bonato, A.,** A survey of web graph models, invited paper for the *Proceedings of Combinatorial and Algorithmic Aspects of Networking*, Vol. **3405,** 2005.

5. **Bonato, A.**, J. Janssen, Limits and power laws of models for the web graph and other networked information spaces, *Proceedings of Combinatorial and Algorithmic Aspects of Networking*, Vol. **3405,** 2005.

6. **Bonato, A.**, J. Janssen, Infinite limits of the duplication model and graph folding, *Proceedings of EUROCOMB05, Discrete Mathematics and Theoretical Computer Science.*

**Submitted papers**

7. **Bonato, A.**, C. Wang, Domination parameters in random graphs, submitted to the *Proceedings of LATIN08.* 12 pages.
8. Baker C., **A. Bonato**, N. McKay, Graphs with the n-e.c. adjacency property constructed from resolvable designs, submitted to *Discrete Mathematics.* 11 pages.
9. **Bonato, A.**, J. Janssen, C. Wang, The $n$-ordered graphs - a new graph class, submitted to *Journal of Graph Theory.* 16 pages.
10. **Bonato, A.**, The search for n-e.c. graphs, submitted to the *Journal of Graph Theory.* 15 pages.

**RESEARCH PRESENTATIONS** :

**Invited Presentations at Conferences**

1. Random graph models of the web graph, 4th National Conference on Mathematical and Computational Models, Coimbatore, India, December 2007.
2. Modelling the infinite web, Miniconference on the Mathematics of Computation, Dalhousie University, August 2006.
3. Cop density and random graphs, SIAM Conference on Discrete Mathematics 2006, University of Victoria, June 2006.
4. Three problems on finite graphs, Graphs and homomorphisms workshop 2006, Bellairs Institute, Barbados, April 2006.
5. The infinite locally random graph, Midsummer Combinatorial Conference XII, Prague, Czech Republic, August 2005.
6. New vertex partition properties of graphs and digraphs, Canadian Mathematical Society Summer 2001 Meeting, University of Saskatoon, June 2001.
7. Graphs with a prescribed adjacency property, Combinatorics Workshop, Memorial University of Newfoundland, May 1999.

**Contributed Presentations at Conferences**

1. A spatial web graph model with local influence regions, The 5th Workshop On Algorithms And Models For The Web-Graph, San Diego, 2007.
2. Vertex pursuit games in stochastic network models, Combinatorial and Algorithmic Aspects of Networking, Dalhousie University, 2007.
3. Models of the web graph, CMS-MITACS Joint Conference, Winnipeg, June 2007.
4. Homomorphisms and the web, CanaDAM 2007, 1st Canadian Discrete and Algorithmic Mathematics Conference, Banff, May 2007.
5. Structural properties of infinite limits of self-organizing networks, 2006 Workshop on Algorithms and Models for the Web-Graph, BIRS, December 2006.
6. Random graph models and the web, Canadian Mathematical Society Winter 2005 Meeting, Victoria, December 2005.
7. Infinite limits and models of the web graph, Models of Real-World Random Networks, MSRI, Berkeley, April 2005.
8. Massive scale-free networks and infinite graphs, AMS Special Session on Probabilistic Paradigms in Combinatorics, Newark, Delaware, April 2005.
9. Limits of directed models of the web graph, Combinatorial and Algorithmic Aspects of Networking, BIRS, Alberta, August 2004.
10. A unifying model for massive self-organizing networks, Graphs, Games, and the Web Symposium, CMS Summer Meeting, Dalhousie University, June 2004.
11. Mutually embeddable vertex-transitive graphs and trees, Fifth Slovenian International Conference On Graph Theory, Bled, Slovenia, June 2003.
12. Mutually embeddable vertex-transitive graphs and trees, Graph theory of Brian Alspach, Simon Fraser University, May 2003.
13. Limits of models of web graphs, 2002 Workshop on Algorithms and Models for the Web-Graph, Vancouver, November 2002.
14. Partitioning a graph into two isomorphic pieces, 2002 SIAM Conference on Discrete Mathematics, San Diego, August 2002.

15. Homomorphisms, Amalgamation, and Pseudo-homogeneous Graphs, Graph Coloring and Symmetry, 2002 American Mathematical Society Joint Summer Research Conferences in the Mathematical Sciences, Mount Holyoke University, U.S.A., July 2002.

16. Affine planes and adjacency properties of graphs, Combinatorics 2002, Maratea, Italy, June 2002.

17. From Affine Planes to Graphs with the 3-e.c. Adjacency Property, 15th Midwestern Conference on Combinatorics, Cryptography, and Computing, University of Nevada, October 2001.

18. New vertex partition properties of graphs and digraphs, 18th British Combinatorial Conference, University of Sussex, Brighton, England, July 2001.

19. New vertex partition properties of graphs and digraphs, Horizons in Combinatorics Conference, Vanderbilt University, May 2001.

20. New vertex partition properties of graphs and digraphs, 32nd Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Louisiana State University, March 2001.

21. On fractal properties of graphs, the 33rd Midwestern Graph Theory meeting, Wright State University, October 2000.

22. On 2-e.c. graphs, tournaments, and hypergraphs, 6th International Conference on Graph Theory, Université de la Mediterranean, Luminy, France, August 2000.

23. The monoid of the random graph, Workshop on Colourings and Homomorphisms, Simon Fraser University, July 2000.

24. Universal $G$-colorable graphs and uniquely $G$-colorable graphs, 10th SIAM Conference on Discrete Mathematics, Minneapolis, June 2000.

25. Adjacency properties in classes of graphs, 10th SIAM Conference on Discrete Mathematics, Minneapolis, June 2000.

26. Graph homomorphisms and saturated cores, 31st Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Florida Atlantic University, March 2000.

27. Tournaments and orders with the pigeonhole property, Algebraic Combinatorics Workshop IV, The Fields Institute, November 1999.

28. On $n$-e.c. line-critical graphs, 13th Midwestern Conference on Combinatorics, Cryptography, and Computing, Illinois State University,October 1999.

29. The hunt for the $n$-e.c. graphs, 17th British Combinatorial Conference, University of Kent at Canterbury, Canterbury, England, July 1999.

30. The model companion of colour classes, Association for Symbolic Logic, 1998 Annual Meeting, University of Toronto, May 1998.

31. A pigeonhole principle for relational structures, Association for Symbolic Logic, 1997-98 Winter Meeting, Baltimore, Maryland, January 1998.

**Presentations in Seminars**

1. Vertex pursuit games in stochastic network models, University of Waterloo, October 2007.

2. Modelling self-organizing networks with a hidden metric, McGill University, June 2007.

3. The web graph, Tutte Seminar, University of Waterloo, May 2007.

4. The web graph, Department Seminar, Wilfrid Laurier University, March 2007.

5. Pseudo-random graphs from combinatorial designs, Discrete Mathematics Seminar, Wilfrid Laurier University, September 2006.

6. Modelling the infinite web, Algorithms and Complexity Seminar, University of Waterloo, September 2006.

7. The cop density of a graph, Graph theory seminar, Dalhousie University, June 2006.

8. The web graph, Computer Science Colloquium, Université de Montréal, March 2006.

9. Massive scale-free networks and infinite graphs, Combinatorics seminar, University of California, San Diego, January 2005.

10. The web graph, Graph theory seminar, University of Waterloo, January 2005.

11. The infinite random graph and the web, Combinatorics seminar, Queen Mary University of London, England, November 2004.

12. An introduction to the mathematics of web search engines, Mathematics Department Seminar, Wilfrid Laurier University, April 2004.

13. A property of random graphs, Graph Theory seminar, University of Waterloo, February 2004.

14. Stochastic models of the web graph and biological networks, Discrete Mathematics Seminar, Wilfrid Laurier University, October 2003.

15. Limits of web graph models, Graph Theory Seminar, Dalhousie University, August 2003.

16. Modelling the web graph and other massive self-organizing networks, Mathematics Department Colloquium, Novi Sad University, Yugoslavia, July 2003.

17. Massive self-organizing networks and the web graph, MPCS 2002-2003 Seminar Series, Ryerson University, April 2003.

18. Massive self-organizing networks and the web graph, Mathematics Department Seminar, Wilfrid Laurier University, March 2003.

19. The colouring order and the natural order on retracts, Applied Algebra Seminar, York University, September 2002.

20. Limits of models of the web graph, Discrete Mathematics Seminar, Wilfrid Laurier University, September 2002.

21. Breaking a graph into two isomorphic pieces, Mathematics Department Seminar, Wilfrid Laurier University, April 2002.

22. The colouring order and the natural order on retracts, Algebraic Combinatorics Seminar, the University of Waterloo, January 2002.

23. The infinite random graph, Department Seminar, Mount Allison University, December 2001.

24. On an adjacency property of almost all graphs, Graph Theory Seminar, Dalhousie University, December 2001.

25. The infinite random graph: a meeting place for combinatorics, algebra, and logic, Tutte Colloquium, University of Waterloo, November 2001.

26. The 3-e.c. adjacency property, Discrete Mathematics Seminar, Wilfrid Laurier University, September 2001.

27. Skolem labellings of graphs, Mathematics Department Seminar, Wilfrid Laurier University, April 2001.

28. A new fractal property of graphs and oriented graphs, Graph theory seminar, Vanderbilt University, February 2001.

29. A new fractal property of graphs and oriented graphs, Combinatorics Seminar, University of Toronto, November 2000.

30. On fractal properties of graphs, Discrete Mathematics Seminar, Wilfrid Laurier University, September 2000.

31. Ramsey theory, Mathematics Department Seminar, Wilfrid Laurier University, March 2000.
32. Exhausting the inexhaustible graphs, Department seminar, Mount Allison University, New Brunswick, February 2000.
33. Graph homomorphisms and saturated cores, Algebraic Combinatorics Seminar, The University of Waterloo, February 2000.
34. The random graph, Discrete Mathematics seminar, Wilfrid Laurier University, September 1999.
35. On uniquely $G$-colourable graphs, Graph Theory Seminar, Dalhousie University, February 1999.
36. The playful universe: model theory and games, Logic seminar, Mount Allison University, December 1998.
37. My favourite infinite graph, Graph Theory Seminar, Dalhousie University, October 1998.
38. Universal graphs and structures, Universal Algebra and Logic seminar, the University of Waterloo, April 1998.
39. $G$-colourable graphs, Universal Algebra and Logic seminar, McMaster University, December 1997.

## UNDERGRADUATE RESEARCH SUPERVISED OR CO-SUPERVISED:

### Wilfrid Laurier University

1. *Spring 04*: Alexandru Costea, Local structure in matchings, funded by an NSERC Undergraduate Research Award and my NSERC Discovery grant.
2. *Winter 04*: Gabriel Shelley, Simulations of web graph models, funded by a MITACS grant.
3. *Spring 02*: David Crausen, On certain partition properties of finite graphs, funded by an NSERC Undergraduate Research Award and my NSERC Discovery grant.
4. *Spring 01*: Alan Jewitt-Dyck, Skolem labellings of trees, funded by a Wilfrid Laurier University Undergraduate Research Assistantship and by my NSERC grant.
5. *Spring 00*: Alan Jewitt-Dyck, Skolem labellings of trees, funded by my NSERC grant.

6. *Spring 99*: (with K. Cameron) Jacqueline Freeman, Adjacency properties of graphs, funded by an NSERC Undergraduate Research Award and Dr. Cameron's NSERC Discovery grant.

**Mount Allison University**

7. *Spring 99*: (with C. Baker) Patrick Kergin, Skolem arrays, funded by an NSERC Undergraduate Research Award and Dr. Baker's NSERC Discovery grant.

**COURSES TAUGHT:**

| **Course Number** | **Course Name** | **Semester(s)** | **University** |
|---|---|---|---|
| AARMS | A Course on the Web Graph | Spring 06 | Dalhousie |
| MA103 | Calculus I | F05 | WLU |
| MA104 | Calculus II | W04 | WLU |
| MA110 | Introduction to Differential and Integral Calculus | F05 | WLU |
| MA121 | Sets and Algebra | F02, F03 | WLU |
| MA122 | Introductory Linear Algebra | F99, W00, F00 W01, F01, W02, W03 | WLU |
| MA130 | Calculus for Students of Business and Economics | W98, F06, W07, F07 | WLU |
| MA215 | Set theory | F05 | WLU |
| MA238 | Discrete Mathematics | W03, W04, W06 | WLU |
| MA200 | Advanced Calculus | F00, F01 | WLU |
| MA222 | Linear Algebra I | W00 | WLU |
| MA317 | Number Theory | F99 | WLU |
| MA338 | Graph Theory | F07 | WLU |
| MA395B/ CP400I | Mathematics of Networked Information Spaces | F03 | WLU |
| MA425 | Group Theory | W02 | WLU |
| MA475 | Rings and Fields | F02 | WLU |
| MA488 | Computation and Logic | W01 | WLU |
| Math 3111 | Real Analysis I | F98 | Mount Allison |
| Math 3121 | Real Analysis II | W99 | Mount Allison |
| Math 4131 | Complex Variables | W99 | Mount Allison |
| Math 2221 | Linear Algebra | F98 | Mount Allison |
| Math 1111 | Calculus | F99 | Mount Allison |
| Math 107 | Calculus I for Life Sciences | F97 | UW |

**SERVICE:**

Board of Directors of MITACS, 2007-2008.
MITACS Conflict of Interest Committee, 2007-2008.

**UNIVERSITY COMMITTEE SERVICE:**

1. 2007–08: Graduate Faculty Council
2. 2007-08: Graduate Committee on NSERC Scholarships
3. 2006: Faculty of Science Curriculum Committee
4. 2001 - 2004: Animal Care Committee
5. 2001 - 2004: University Faculty Council Nominating Committee
6. 2001 - 2004: Graduate Faculty Council
7. 2003 - 2004: Senate Student Life Committee
8. 2000 - 2004: PROWIS Steering Committee
9. 2000 - 2003: Senate Library Committee
10. 2000 - 2002: Senate Ceremonials Committee

**DEPARTMENT COMMITTEE SERVICE:**

1. 2006 - present: Graduate Coordinator for Mathematics
2. Fall 2006: Chair, DAP Subcommittee for Tenure appointment
3. Fall 2005 - 2006: Chair, Mathematics Curriculum Committee
4. Fall 2005: Chair, DAP Subcommittee for Candidacy appointment
5. Fall 2003: Mathematics Search Committee for Tenure-track positions
6. Spring 2003: Mathematics Search Committee for Limited Term positions
7. 2003: Bilateral Workload Review Committee for the Mathematics Department
8. 2000 - 2002: Mathematics Curriculum Committee