

CURRICULUM VITAE

CRISTINA BALLANTINE

Assistant Professor of Mathematics

College of the Holy Cross

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Research Interests

Number Theory, Automorphic Forms and Representation Theory, Buildings, Combinatorics

Education

Ph.D. University of Toronto, Canada (November 1998)

Advisor: Professor James Arthur

Thesis: *Hypergraphs and Automorphic Forms*

M.Sc. University of Toronto, Canada (November 1992)

Diplom University of Stuttgart, Germany (1988)

Academic Appointments

Sept. 2002—Present College of the Holy Cross: *Assistant Professor*

Sept. 2004—July 2005 Universität Münster: *Fulbright Research Scholar*

Sept. 2000—Aug.2002 Dartmouth College: *J.W. Young Research Instructor*

Sept. 1999—Aug. 2000 Bowdoin College: *Visiting Assistant Professor*

Sept. 1998—Aug. 1999 University of Wyoming: *Visiting Assistant Professor*

Sept. 1996—Jan. 1998 University of Toronto, Canada: *Instructor*

Aug. 1994—Dec. 1994 Santa Rosa Junior College, CA: *Instructor*

Courses Taught

At Holy Cross:

Advanced Placement Calculus, Calculus for the Physical and Life Sciences I & II,
Multivariable Calculus, Combinatorics, Abstract Algebra I & II

At Dartmouth College:

Calculus, Honors Calculus, Multivariable Calculus, Honors Multivariable Calculus, Honors Number Theory, Topics in Algebra (graduate)

At Bowdoin College:

Integral Calculus, Advanced Topics in Algebra, Statistical Reasoning

At the University of Wyoming:

Finite Mathematics, Multivariable Calculus, Theory of Numbers

At the University of Toronto:

Calculus

At Santa Rosa Junior College:

Finite Mathematics

Tutorials, Internships, Honor Theses

At College of the Holy Cross:

Directed Reading: Courtney Jason '03, and Kathleen Leahy '04
Cryptography and Number Theory (Spring 2003)

Honors Thesis: Amy Borbely '07
Symmetry Groups of Overlapping Figures in the Plane (2006-2007)

At Dartmouth College:

Independent Reading: Gabriela Dumitrascu (Master student)
Lie Groups (Spring 2002)

Grants, Awards, Honors

2006	Batchelor Ford Foundation Summer Fellowship (\$3, 500)
2004-2005	Fulbright Junior Research Award to Germany (\$21, 700)
2004	Batchelor Ford Foundation Summer Fellowship (\$3, 500)
2003	Research and Publication Grant (\$500)
2002	AWM-NSF Travel Grant (\$700)
1996	Daniel B. DeLury Teaching Award
1992—1994, 1995—1997	University of Toronto Open Fellowship
1991—1992	Simcoe Fellowship

Research and Publications

- 1) *A Combinatorial Interpretation for the Coefficients in the Kronecker Products* $s_{(n-p,p)} * s_\lambda$ (with R. Orellana), Séminaire Lotharingien de Combinatoire 54A, 2006, Article B54Af
- 2) *Determinants Associated to Zeta Matrices of Posets* (with S. Frechette and J. Little), Linear Algebra and its Applications 411, 2005, 364-370
- 3) *On the Kronecker Product* $s_{(n-p,p)} * s_\lambda$ (with R. Orellana), refereed abstract, on CD-ROM: FPSAC (Formal Power Series and Algebraic Combinatorics) 2005, Taormina, Italy
- 4) *On the Kronecker Product* $s_{(n-p,p)} * s_\lambda$ (with R. Orellana), Elec. Journal of Combinatorics, Vol 12, 2005, R28, 1-26
- 5) *Hecke Operators for GL_n and Buildings* (with T. Shemanske and J. Rhodes), Acta Arithmetica 112, 2004, 131-140
- 6) *Ramanujan Type Graphs and Bigraphs*, Dynamical systems and differential equations (Wilmington, NC, 2002). Discrete and Continuous Dynamical Systems 2003, suppl., 78-82
- 7) *A Simple Proof of Rolle's Theorem for Finite Fields* (with J. Roberts), The American Mathematical Monthly, Vol. 109 (1), 2002, 72-74
- 8) *A Hypergraph with Commuting Partial Laplacians*, Canad. Math. Bull. Vol. 44 (4), 2001, 385-397
- 9) *Ramanujan Type Buildings*, Canad. J. Math. Vol. 52 (6), 2000, 1121-1148

Research Papers In-Progress

- 10) *A Mathematical Analysis of some indices used to classify ammonite shells*, submitted
- 11) *Biregular graphs associated with $U(3)$* , in preparation
- 12) *Bounded Spherical Functions for $GL_n(\mathbb{Q}_p)$* , in preparation
- 13) *Rolle's Theorem over Local Fields* (with T. Shemanske), preprint

Non-refereed Publications

- 14) *Math Mom*, The Funnel (the news magazine of the German-American Fulbright Commission), Number 1, Volume 42, Winter 2005, 16-17

Translations

- 15) *Early Cretaceous microfacies and algae from the central - eastern sectors of the Moesian Carbonate Platform* by Ovidiu Dragastan, Ion Stefan Popescu, Aida Popescu, to appear in *Acta Paleontologica Romaniae* (translation from Romanian into English)
- 16) *A group theoretical and structure analytical study of the Moorish ornaments from Alhambra in Granada*, Edith Müller, Thesis, University of Zürich, 1944, 129 pages (translation from German into English), in preparation

Invited Presentations

- July 2006 *Combinatorics and Representation Theory of p -adic Groups*, University of Victoria, BC
- Oct. 2005 *$GL_n(\mathbb{Q}_p)$ - From Buildings to Representations and Back*, Orono, Maine
Maine/Québec Number Theory Conference
- Nov. 2004 *On the Kronecker Product $s_{(n-p,p)} * s_\lambda$* , Hannover, Germany
Algebra Seminar, Universität Hannover
- Feb.2004 *Ramanujan Type Graphs and Bigraphs*, IPAM, Los Angeles
Workshop on Automorphic Forms, Group Theory and Graph Expansion
- May 2002 *Ramanujan Type Graphs and Bigraphs*, Wilmington, NC
Fourth International Conference on Dynamical Systems and Differential Equations
- Apr. 2001 *Spectra of Graphs and Automorphic Forms*
Univ. of Massachusetts Amherst
- Oct. 2000 *Hypergraphs and Automorphic Forms*
Five College Number Theory Seminar
- Oct. 1999 *Expander Graphs and Automorphic Forms*, Orono, Maine
Second Annual Maine-Québec Number Theory Conference

Other Presentations

- July 2006 *Combinatorics and Representation Theory of p -adic Groups*
College of the Holy Cross, Clavius Seminar
- July 2006 *From Buildings to Representations and Back Via Hecke Operators*
Canadian Number Theory Association IX Meeting, Vancouver, BC
- May 2006 *Zeta Functions of Graphs, Buildings and Ramanujan Graphs*, IAS, Princeton
Program for Women and Mathematics
- March 2006 *$GL_n(\mathbb{Q}_p)$ - From Buildings to Representations and Back Via Hecke Operators*
20th Annual Workshop on Automorphic Forms, Boulder, CO

Presentations (continued)

- March 2006 *Zeta Functions of Finite Graphs, the Graph Theoretic Riemann Hypothesis and Ramanujan Graphs*, College of the Holy Cross
- June 2005 *On the Kronecker Product $s_{(n-p,p)} * s_\lambda$* (poster), Taormina, Italy
17th Annual International Conference on Formal Power Series and Algebraic Combinatorics
- June 2005 *On the Kronecker Product $s_{(n-p,p)} * s_\lambda$* , Mainz, Germany
Joint Meetings of the AMS, DMV and ÖMG
- June 2005 *Towards a p -adic Langlands Program*, Münster, Germany
Oberseminar, Universität Münster
- April 2005 *Bounded Spherical Functions for $GL_2(\mathbb{Q}_p)$* , Münster, Germany
Number Theory Seminar, Universität Münster
- November 2004 *p -adic Differential Equations*, Münster, Germany
Oberseminar, Universität Münster
- October 2004 *Ramanujan Graphs*, Münster, Germany
Number Theory Seminar, Universität Münster
- November 2003 *Rolle's Theorem Over Finite and Local Fields*, Wellesley, MA
MAA/NES regional meeting
- October 2002 *Rolle's Theorem over Finite and Local Fields*, College of the Holy Cross
- Jan. 2002 *A Simple Proof of Rolle's Theorem for Finite Fields*, San Diego
Joint Mathematics Meetings, General Contributed Paper Session
- Nov. 2001 *Expander Graphs and Automorphic Forms*, Dartmouth College
- March. 2001 *Spectra of Graphs and Automorphic Forms*, Palo Alto, CA
newline 15th Annual Workshop on Automorphic Forms and Related Topics
- April 2000 *The Langlands Program*, Bowdoin College
- Jan. 2000 *Ramanujan Type Buildings*, Joint Mathematics Meetings, Washington, D.C.
Special Session on Modular Forms and Elliptic Functions
- March 1999 *Ramanujan Type Buildings*, Santa Barbara, CA
13th Annual Workshop on Automorphic Forms and Related Topics
- March 1999 *Applications of Number Theory to Subjects From Music to Physics*
University of Wyoming
- Feb. 1999 *The Hecke Algebra and the Satake Isomorphism*
Algebra–Combinatorics Seminar, University of Wyoming
- Nov. 1998 *Affine Buildings*
Joint Seminar on Algebraic Combinatorics, Colorado State University
- Oct. 1998 *Buildings as Hypergraphs and Their Spectra*
Joint Seminar on Algebraic Combinatorics, Colorado State University

Panels

- February 2005 *The Role of the Exchanging Scholar*
Fulbright Berlin Seminar, Berlin, Germany
- Jan. 2001 *Keeping Active in Research*
Joint Meetings of the AMS, New Orleans, LA

Conference Organization and Administration

- Nov. 2006 *Discrete Math Day in the Northeast*
(with S. Frechette and J. Little), College of the Holy Cross
- March 2006 *20th Annual Workshop on Automorphic Forms*, Boulder, CO (session chair)
- Jan. 2003 *Special Session: Elliptic Curves, Modular Forms and Related Topics*
(with S. Frechette and H. Rosson) Joint Meetings of the AMS
Baltimore, MD

Other Recent Conferences Attended

- March 2006 *Discrete Math Day*, SUNY, Albany, NY
- Nov. 2005 *Lie Groups, Representations and Discrete Mathematics*
IAS, Princeton, NJ
- Sept. 2005 *Discrete Math Day*, WPI, Worcester, MA
- Oct. 2004 *Conference on Automorphic Forms and the Trace Formula*,
in honor of James Arthur on the occasion of his 60th birthday
Toronto, Canada

College, Department and Professional Service

College Service:

- Committee on Graduate Studies and Fellowships (July 2006 - June 2009)
- Committee on Faculty Affairs (Sept. 2005 - August 2007)
- Committee on the Economic Status of the Faculty (Sept. 2005 - May 2006)
- Curriculum Committee on Capstone Experiences (January-May 2004)
- Committee on Study Abroad (Sept. 2003 - August 2006)
- Mentor in the *Reach One Teach One* program (Judicial Affairs) (2003-2004)
- Gateway Advising (June 2003, June 2006)

Department Service:

Graduate studies / Departmental Honors advisor (2005-2007)
Departmental Representative to AMS, MAA, AWM (2005-2007)
Library liaison for the Mathematics and Computer Science Department (2002 - 2004)
Interviewer for the Study Abroad Program (April 2003)
Avon Scholarship Committee (May 2003, May 2004)
Departmental representative for the United Way/Holy Cross giving campaign (2003)
Examiner for the German exam (Ph.D. requirement), Dartmouth College (2000 - 2003)

Service to the Profession:

Mentor in the *Program for Women and Mathematics*
Institute for Advanced Study, Princeton, NJ (May 2006)

Knobelaufgaben in kleinen Gruppen (Challenge problems in small groups)
Theresien Grundschule, Münster, Germany (January-May 2005)

Interviewee for *AWM Essay Contest on Biographies of Contemporary Women in Mathematics* (2003, 2005)

Judge for the Science Fair at the University of Wyoming (Spring 1999)

Co-organizer *Discover Science Day*
an event for female high school students at the University of Toronto (April 1997)

Refereeing: Journal of Algebra
NSF Grants
Textbooks for Prentice Hall

Professional Experience

1995	<i>Freelance Translator:</i> English, German, Romanian Performed simultaneous and written translations
Aug. 1989—Sept. 1991	Allianz Life Insurance, Stuttgart, Germany <i>Software analyst and project manager</i> for data base transfer of East German state insurance to Allianz
Jul. 1988—Aug. 1989	Fraunhofer Research Institute, Stuttgart, Germany <i>Scientific assistant</i>