

Dr. Michelle Delcourt

- CONTACT INFORMATION** University of Waterloo
Combinatorics & Optimization Department
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E-mail: mdelcour@uwaterloo.ca
WWW: <http://www.math.uwaterloo.ca/~mdelcour/>
- EDUCATION** **University of Illinois at Urbana–Champaign**, Urbana, IL (USA)
Ph.D., Mathematics August 2011 – May 2017
• Thesis title: “Viewing extremal and structural problems through a probabilistic lens”
• Adviser: József Balogh
M.S., Mathematics December 2012
Georgia Institute of Technology (Georgia Tech), Atlanta, GA (USA)
B.S., Discrete Mathematics August 2007 – May 2011
• Graduated with Highest Honor.
- EMPLOYMENT** **University of Waterloo**, Waterloo (Canada)
Research Assistant Professor, Combinatorics and Optimization Sept. 2018 – Present
University of Birmingham, Birmingham (England)
Research Fellow, Mathematics September 2017 – August 2018
• Supervisor: Will Perkins
- GRANTS (OVER \$180,000)** American Mathematical Society and Simons Foundation
• **AMS-Simons Travel Grant (\$4,000)** 2018–2020
University of Birmingham, Birmingham (UK)
• **PERCAT Career Development Award** 2018
US National Science Foundation
• **Graduate Research Fellowship (\$130,000)** 2011–2016
Mathematical Association of America
• **Dolciani Math Enrichment Grant (Co-author \$6,000)** 2016
Oberwolfach (Germany)
• **US Junior Oberwolfach Fellowship** 2015
University of Illinois, Urbana, IL
• **2015 Public Engagement Grant (PI, \$8,000)**, Office of Public Engagement 2014
• **2014 Public Engagement Grant (PI, \$6,500)**, Office of Public Engagement 2013
• **UIUC REGS1 Summer Research Fellowship (\$4,500)**, Department of Mathematics .. 2012
• **UIUC REGS0 Summer Research Fellowship (\$4,000)**, Department of Mathematics .. 2011
- AWARDS** University of Illinois, Urbana, IL
• **Graduate Student Leadership Award**, The Graduate College 2016
• **Graduate Teacher Certificate Award**, Center for Innovation in Teaching and Learning 2013
Georgia Tech, Atlanta, GA
• **Outstanding Undergraduate Researcher Award**, College of Sciences 2011
• **Exceptional Research and Service Award**, School of Mathematics 2011
- JOURNAL PUBLICATIONS** 12. **Delcourt, M**, G. Perarnau, and L. Postle. Rapid mixing of Glauber dynamics for colorings below Vigoda’s $11/6$ threshold. *In Preparation*. See arXiv:1804.04025 for latest version.
11. **Delcourt, M**, M. Heinrich, and G. Perarnau. The Glauber dynamics for edges colourings of trees. *Submitted to Annals of Applied Probability*. See arXiv:1812.05577 for latest version.
10. Bernshteyn, A, **M. Delcourt**, and A. Tserunyan. Independent Sets in Algebraic Hypergraphs. *Submitted to Journal of the European Mathematical Society*. See arXiv:1809.05205.

9. Bi, J, R. Davidson, **M. Delcourt**, R. Guzman, C. Monical, J.A. Sanchez, Y. Ren, and S. Zha. A combinatorial method for connecting BHV spaces representing different numbers of taxa. *Submitted to Systematic Biology*. See arXiv:1708.02626 for latest version.
8. Bernshteyn, A, **M. Delcourt**, H. Towsner, and A. Tserunyan. A Nonalgorithmic Short Proof of the Containers Theorems for Hypergraphs. *Proceedings of the AMS*, to appear.
7. **Delcourt, M** and L. Postle. Random 4-regular graphs have 3-star-decompositions asymptotically almost surely. *European Journal of Combinatorics*, 72C (2018), 97–111.
6. Balogh, J, **M. Delcourt**, B. Lidický, and C. Palmer. Counting rainbow copies of C_4 in edge-colored hypercubes. *Discrete Applied Mathematics*, 210 (2016), 35–37.
5. **Delcourt, M** and A. Ferber. On a Conjecture of Thomassen. *Electronic Journal of Combinatorics*, Volume 22, Paper 3.2 (2015), 1–8.
4. Balogh, J, S. Das, **M. Delcourt**, H. Liu, and M. Sharifzadeh. Intersecting families of discrete structures are typically trivial. *J. Comb. Theory Ser. A*, **132** (2015), 224–245.
3. Calkin, N.J., J. Davis, **M. Delcourt**, Z. Engberg, J. Jacob, and K. James. Taking the Convolution out of Bernoulli Convolutions: A Discrete Approach. *Integers*, 13 (2013), no. 19, 1–12.
2. Carraher, J, I. Choi, **M. Delcourt**, L. Erickson, and D.B. West. Locating a robber on a graph via distance queries. *Journal of Theoretical Computer Science*, Vol. 463, 7 Dec. 2012, 54–61.
1. Calkin, N.J., J. Davis, **M. Delcourt**, Z. Engberg, J. Jacob, and K. James. Discrete Bernoulli Convolutions. *Proceedings of the AMS*, Vol. 139, No. 5, May 2011, 1579–1584.

CONFERENCE
PUBLICATIONS

3. Chen, S, **M. Delcourt**, A. Moitra, G. Perarnau, and L. Postle. Improved Bounds for Randomly Sampling Colorings via Linear Programming. *Proceedings of the 30th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2019)*, to appear.
2. **Delcourt, M** and L. Postle. On the List Coloring Version of Reed’s Conjecture. *Elec. Notes in Discrete Mathematics*, Vol. 61 (2017), 343–349.
1. **Delcourt, M** and L. Postle. On Star Decompositions of Random Regular Graphs. *Elec. Notes in Discrete Mathematics*, Vol. 61 (2017), 339–342.

COLLOQUIUM
TALKS

3. **Rapid mixing of Glauber dynamics for colorings below Vigoda’s threshold** . Sept. 2018
Tutte Colloquium, University of Waterloo (**Canada**)
2. **Random colorings of bounded degree graphs** May 2018
Colloquia in Combinatorics, London School of Economics (**UK**)
1. **Introduction to Extremal and Probabilistic Combinatorics** Sept. 2016
Graduate Student Colloquium, University of Illinois

INVITED
CONFERENCE
TALKS

12. **Random colorings of bounded degree graphs** Jul. 2018
ICGT, Université Lyon (**France**)
11. **Containers-type results in algebraic geometry** Jul. 2017
SiGMA, University of Waterloo (**Canada**)
10. **On the List Coloring Version of Reed’s Conjecture** Jun. 2017
CanaDAM, Ryerson University (**Canada**)

9. **Intersecting Families of Permutations** Apr. 2017
AMS Sectional, Indiana University
8. **Star decompositions of random regular graphs** Nov. 2016
AMS Sectional, North Carolina State University
7. **Decomposing 4-Regular Random Graphs into Claws** Jun. 2016
SIAM Discrete Math, Georgia State University
6. **Claw decompositions of random 4-regular graphs** Apr. 2016
AMS Sectional, North Dakota State University
5. **The Typical Structure of Intersecting Families** Apr. 2015
Atlanta Lecture Series, Georgia Tech
4. **Real Stable Polynomials and Van der Waerden's Conjecture** Apr. 2015
Kadison-Singer Conjecture, Oberwolfach (Germany)
3. **A Discrete Approach to Bernoulli Convolutions** Mar. 2014
Workshop in Combinatorics, University of Szeged (Hungary)
2. **Taking the Convolution out of Bernoulli Convolutions** Jun. 2010
Mini-Conference on Additive Combinatorics, Georgia Tech
1. **Taking the Convolution out of Bernoulli Convolutions** Oct. 2008
Mini-Conf. on Discrete Math and Algorithms, Clemson University

SELECT
CONTRIBUTED
CONFERENCE
TALKS

8. **On Star Decompositions of Random Regular Graphs** Aug. 2017
EuroComb, TU Wien (Austria)
7. **On the List Coloring Version of Reed's Conjecture** Aug. 2017
Random Structures and Algorithms, Inst. of Eur. Culture (Poland)
6. **Intersecting families in random settings** Jul. 2015
Random Structures and Algorithms, Carnegie Mellon University
5. **Intersecting Families of Permutations** Jun. 2015
Conn. in Discrete Mathematics, Simon Fraser University (Canada)
4. **Infinite Families of Ramanujan Hypergraphs** May 2015
28th Cumberland Conference, University of South Carolina
3. **Counting rainbow copies of C_4 in hypercubes** Jul. 2014
SUMMIT 240, Eötvös Loránd University (Hungary)
2. **Discrete Bernoulli Convolutions** Jul. 2013
7th Czech-Slovak Int. Symp., P.J. Šafárik University (Slovakia)
1. **Discrete Bernoulli Convolutions** Apr. 2013
Graduate Student Combinatorics Conf., University of Minnesota

INVITED
SEMINAR TALKS
AWAY FROM
HOME
INSTITUTION

16. **Carnegie Mellon University**, ACO Seminar Oct. 2018
15. **Université de Bordeaux (France)**, Graphes et Optimisation Oct. 2018
14. **University of Bristol (UK)**, Combinatorics Seminar Mar. 2018
13. **University of Warwick (UK)**, DIMAP Seminar Oct. 2017
12. **Oxford (UK)**, Combinatorial Theory Seminar Oct. 2017

11. **London School of Economics (UK)**, Combinatorics, Games and Optimisation . . Oct. 2017
10. **Université de Bordeaux (France)**, Graphes et Optimisation Sept. 2017
9. **University of Washington**, UW Combinatorics Seminar Mar. 2017
8. **University of Waterloo (Canada)**, Graphs & Matroids Seminar Nov. 2016
7. **Iowa State University**, Discrete Math Seminar Apr. 2016
6. **University of Waterloo (Canada)**, Graph Theory Seminar Nov. 2015
5. **University of Szeged (Hungary)**, Komb. Bonyolultságelmélet Szem. Jul. 2015
4. **University of Nebraska-Lincoln**, Discrete Math Seminar Jan. 2015
3. **University of Szeged (Hungary)**, Komb. Bonyolultságelmélet Szem. Jul. 2014
2. **ETH Zürich (Switzerland)**, Mittagsemnar Jun. 2014
1. **ENS de Lyon (France)**, Séminaire Graphes et structures discrètes Apr. 2014

INVITED SEMINAR TALKS AT HOME INSTITUTION **University of Waterloo**, Waterloo (Canada)
 Graph and Matroids Seminar Nov. 2018
University of Birmingham, Birmingham (UK)
 Combinatorics and Probability Seminar Oct. 2017

University of Illinois, Urbana, IL
 Algebra, Geometry and Combinatorics Seminar Nov. 2016
 Graph Theory and Combinatorics Seminar Oct. 2016, Nov. 2014
 Graduate Student Number Theory Seminar Oct. 2015, Oct. 2013

Georgia Tech, Atlanta, GA
 Undergraduate Research Seminar Seminar Dec. 2009
 Senior Seminar Series Nov. 2008

ADVISING AND MENTORING **Mentor**, Nebraska Conference for Undergraduate Women in Math, UNL Jan. 2015

- Undergraduate Research**
- **J. Bi and J.A. Sanchez and Y. Ren and S. Zha** Fall 2016
 Undergraduate students in mathematics, physics, and computer science, University of Illinois. Illinois Geometry Lab project using combinatorics to analyze phylogenetic methods from mathematical biology. With research meetings twice a week, the project resulted in a conference poster and one paper. Primary advisers: Ruth Davidson and Rosemary Guzman.
 - **K. Hou and Y. Song and Z. Wang** Fall 2013
 Undergraduate students in mathematics, physics, and computer science, University of Illinois. Illinois Geometry Lab project studying percolation theory including conductors and infectious diseases. With research meetings once a week, the project resulted in Mathematica tutorials, laser cut plastic models, and a conference poster. Primary adviser: Kay Kirkpatrick.

SERVICE **Outreach Grants**
Dolciani Math Enrichment Grant (Co-author \$6,000), Math. Association of America . . . 2016
2015 Public Engagement Grant (PI, \$8,000), University of Illinois 2014
2014 Public Engagement Grant (PI, \$6,500), University of Illinois 2013

Outreach Awards

Graduate Student Leadership Award, University of Illinois Apr. 2016
Exceptional Research and Service Award, School of Mathematics, Georgia Tech 2011

Volunteer, Gathering for Gardner, University of Illinois 2017

Volunteer, Central Illinois Day of the Girl 2014

Oral Judge, ICTM State Math Contest Finals 2012–2013

Illinois Geometry Lab, University of Illinois

Outreach Manager 2014–2016

Associate Manager 2013–2014

- Planned and implemented outreach activities in local elementary, middle, and high schools.
- Conducted over thirty field trips to schools in Urbana-Champaign and under-served communities in Chicago, reaching over two thousand participants.
- Led six training sessions to show local high school teachers and university instructors how to incorporate active learning techniques in the classroom.
- Archived authored materials: <http://faculty.math.illinois.edu/~delcour2/service.html>

Association for Women in Mathematics, University of Illinois

Outreach Chair 2015–2016

President 2014–2015

Vice President 2012–2014

- Organized weekly academic, outreach, and social events for graduate students.
- Wrote grants, procured other institutional funding, and monitored the budget.
- Arranged professional development opportunities including informal chats with colloquium speakers, panel discussions, and tutorials.

Sonia Kovalevsky Math Day, University of Illinois

Organizer 2013–2017

- Founded Sonia Kovalevsky Math Days at the University of Illinois, a free day long event to introduce high school girls to higher level mathematics.
- Procured funding, developed lesson plans, advertised, recruited volunteers, and organized a total of eight SKM Days on topics such as “Math and Magic,” “Logic in Wonderland,” and “Mathematical Paradoxes.”
- Archived materials at: <https://faculty.math.illinois.edu/~delcour2/service.html>

Girls Engaged in Math and Science (GEMS), University of Illinois

Organizer 2014–2015

- Founded GEMS at the Orpheum Children’s Science Museum, a free four day long workshop for middle school girls.
- Procured funding, developed lesson plans, advertised, recruited volunteers, and organized a total of three GEMS Workshops on topics such as “Geometry and Art.”
- Archived materials at: <https://faculty.math.illinois.edu/~delcour2/service.html>

Summer Illinois Math Camp, University of Illinois

Organizer 2015

Instructor, Number Theory 2015

- Co-founded and procured funding for SIM Camp at the University of Illinois, a free week-long workshop for middle school and high school students.
- Taught part of a course on “Making and breaking codes: Cryptography.”

Georgia Tech High School Math Competition, Georgia Tech

Organizer 2008–2011

- Only undergraduate member of the committee responsible for organizing, funding, and running the HSMC for 450 high school students.
- Responsible for organizing volunteers and compilation of competition exams.

- Wrote questions, proctored competition, graded, and tabulated scores.

TEACHING
EXPERIENCE

Teaching Awards

- Graduate Teacher Certificate Award**, University of Illinois Apr. 2013
- On List of Teachers Ranked as Outstanding (top 10%)**, University of Illinois Spring 2017
- On List of Teachers Ranked as Excellent (top 30%)**, University of Illinois Spring 2012, Fall 2016

University of Waterloo, Waterloo, Canada

Instructor, with Curriculum Responsibilities **Sept. 2018 to Dec. 2018**

- Math 239: Introduction to Combinatorics
 - Undergraduate course in combinatorics (100 students)

University of Birmingham, Birmingham, England

Guest Lecturer **Oct. 2017**

- Math 2S: Statistics
 - Undergraduate course in statistics (250 students)
 - Main instructor: W. Perkins, Lecture: “The Second Moment Method”

University of Illinois, Urbana, IL

Instructor, with Curriculum Responsibilities **Aug. 2016 to May 2017**

- Instructor for Math 181: A Mathematical World **Fall 2016, Spring 2017**
 - Undergraduate course for non-math majors (30 students).
 - Developed and implemented inquiry-based lessons on topics such as the Game Theory of Game Shows, TSP and Pokémon Go, Non-transitive Dice and Paradoxes in Voting Theory. Materials: <http://faculty.math.illinois.edu/~delcour2/math181spring2017.html>
 - Supervised student projects consisting of an essay, educational lesson, piece of artwork, or musical composition relating to some aspect of mathematics.
 - Wrote, proctored, and graded weekly quizzes and exams.

Guest Lecturer **Oct. 2014**

- Math 580: Introduction to Combinatorics
 - Graduate comprehensive course in combinatorics (40 students)
 - Main instructor: J. Balogh, Lecture: “Menger’s Theorem”

Teaching Assistant **Aug. 2011 to May 2012**

- TA for Math 241: Calculus III **Spring 2012**
 - Responsible for two 1-hour recitations twice a week (for two classes, 30 students each).
 - Held office hours for two hours a week.
 - Wrote weekly quizzes, proctored and graded tests.
- TA for Math 221: Calculus I **Fall 2011**
 - Responsible for 1-hour recitations twice a week (for two classes, 30 students each).
 - Held office hours for two hours a week.
 - Wrote weekly quizzes, proctored and graded tests.

Georgia Tech, Atlanta, GA

Teaching Assistant **Aug. 2009 to Dec. 2009**

- TA for Math 2401: Calculus III Fall 2009
 - Responsible for 1-hour recitations twice a week (35 students).
 - Held office hours for one hour a week.
 - Tutored for all first- and second-year courses for one hour a week in the Tutoring Center.
 - Proctored and graded tests.

- Grader* **Jan 2010 to Dec. 2010**
- Math 3012: Applied Combinatorics Fall 2010
 - Math 3012: Applied Combinatorics Spring 2010

PROFESSIONAL SERVICE **Service Awards**

- Outstanding Referee Award**, Discrete Mathematics 2017
Exceptional Research and Service Award, School of Mathematics, Georgia Tech 2011

Referee Service

- *Journal of Combinatorial Theory, Series B*
- *Combinatorics, Probability and Computing*
- *European Journal of Combinatorics*
- *Electronic Journal of Combinatorics*
- *Journal of Graph Theory*
- *Discrete Mathematics*
- *SIAM Journal on Discrete Mathematics (SIDMA)*
- *ACM-SIAM Symposium on Discrete Algorithms (SODA)*

Seminar Service

- Organizer: Graphs and Matroids Seminar, University of Waterloo (Canada) Winter 2019.

Conference Service

- Co-organizer (with Luke Postle): Mini-symposium on Graph Coloring, CanaDAM, Ryerson University (Canada) June 11–13, 2017.

Committee Service

University of Waterloo, Waterloo, Canada

- Women in Math Committee (Faculty of Mathematics) **Sept. 2018 to Aug. 2020**

University of Illinois, Urbana, IL

- Illinois Geometry Lab Selection Committee **Aug. 2013-May 2016**
- Undergraduate Affairs Committee **Jan. 2016 to May 2016**
- Graduate Affairs Committee **Aug. 2013 to Dec. 2013**

Georgia Tech, Atlanta, GA

- Georgia Tech High School Math Competition Committee **Aug. 2008-May 2011**

PROFESSIONAL EXPERIENCE **University of Birmingham**, Birmingham, England

Postdoctoral Scholar **Sept. 2017 to Present**

- Supervisor: Will Perkins
- Using approaches motivated from statistical physics to study graph coloring questions.

University of Waterloo, Waterloo, Canada

Vising Scholar **May 2017 to Aug. 2017**

United States National Science Foundation

NSF Graduate Research Fellow **Aug. 2011 to Jul. 2016**

- \$130,000 total (for three years over period of five years)
- Tuition and fees (paid to the institution for three years)

University of Szeged, Szeged, Hungary

Vising Scholar **Feb. 2014 to Aug. 2014**

University of Illinois, Urbana, Illinois

Research Assistant **Sep. 2013 to Jul. 2014**

SELECT Graph Theory Workshop, Oberwolfach (**Germany**) Jan. 2019
WORKSHOPS Barbados Workshop on Structural Graph Theory, Bellairs Research Inst. (**Barbados**) .. Apr. 2018
ATTENDED Barbados Workshop on Structural Graph Theory, Bellairs Research Inst. (**Barbados**) .. Mar. 2017
Ergodic theory and Combinatorics Conf., University of Agder (**Norway**) Jun. 2015
Kadison-Singer Conjecture, Oberwolfach (**Germany**) Apr. 2015
Graph limits, groups and stochastic processes, Rényi Institute (**Hungary**) Jun. 2014
Program for Women and Math, IAS and Princeton May 2013
Séminaire de Mathématiques Supérieures, Université de Montréal (**Canada**) Jul. 2012
Second Montreal Spring School in Graph Theory, McGill (**Canada**) Jun. 2012
Summer School in Combinatorics, University of Waterloo (**Canada**) Jul. 2010

PROFESSIONAL **Member**, Association for Women in Mathematics (AWM)
MEMBERSHIPS **Member**, American Mathematical Society (AMS)