

Lucas Mol

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Citizenship: Canadian

Experience

- Assistant Teaching Professor (tenure-track), Department of Mathematics and Statistics, Thompson Rivers University, August 2021 – Present.
- Adjunct Professor (three-year term), Department of Applied Computer Science, University of Winnipeg, July 2020–June 2023.
- Assistant Professor (one-year term), Department of Mathematics and Statistics, University of Winnipeg, July 2020 – June 2021.
- Senior Research Associate, Department of Mathematics and Statistics, University of Winnipeg, August 2019 – June 2020.
Supervisors: James D. Currie, Ortrud R. Oellermann, and Narad Rampersad
- Postdoctoral Fellow, Department of Mathematics and Statistics, University of Winnipeg, August 2016 – August 2019.
Supervisors: James D. Currie, Ortrud R. Oellermann, and Narad Rampersad

Education

- Ph.D. Mathematics, Dalhousie University, June 2016.
Thesis: On connectedness and graph polynomials. [DalSpace](#)
Supervisor: Jason I. Brown
- M.Sc. Mathematics, Dalhousie University, 2012.
Thesis: On the uniformity dimension of hypergraphs. [DalSpace](#)
Supervisor: Jason I. Brown
- B.Sc. (Hons.) Mathematics, Mount Allison University, 2011.

Research

External Research Funding

- **\$90,000 (\$18,000/year)**, NSERC Discovery Grant, *Repetitions in Words: Branching out from Dejean's Theorem*, 2021–2026.
- **\$12,500**, NSERC Discovery Launch Supplement, 2021–2022.

Publications

Names of students are coloured red.

24. R. M. Casablanca, P. Dankelmann, W. Goddard, L. Mol, and O. R. Oellermann, *The maximum average connectivity among all orientations of a graph*, Journal of Combinatorial Optimization, online ready, 2021. [DOI](#) [arXiv](#)
23. J. D. Currie and L. Mol, *The undirected repetition threshold and undirected pattern avoidance*, Theoretical Computer Science **866** (2021), 56–69. [DOI](#) [arXiv](#)
22. L. Mol, [M. J. H. Murphy](#), and O. R. Oellermann, *The threshold dimension and irreducible graphs*, Discussiones Mathematicae Graph Theory, in press, 2021. [DOI](#) [arXiv](#)
21. B. Cameron and L. Mol, *On the mean subtree order of graphs under edge addition*, Journal of Graph Theory **96**(3) (2021), 403–413. [DOI](#) [arXiv](#)
20. R. M. Casablanca, L. Mol, and O. R. Oellermann, *Average connectivity of minimally 2-connected graphs and average edge-connectivity of minimally 2-edge-connected graphs*, Discrete Applied Mathematics **289**, 233–247 (2021). [DOI](#) [arXiv](#)
19. J. I. Brown, C. J. Colbourn, D. Cox, C. Graves, and L. Mol, *Network reliability: Heading out on the highway*, Networks **77**(1), 146–160 (2021). [DOI](#)
18. L. Mol, N. Rampersad, and J. Shallit, *Extremal overlap-free words and extremal β -free words*, Electronic Journal of Combinatorics **27**(4), Article P4.42 (2020). [DOI](#) [arXiv](#)
17. L. Mol and N. Rampersad, *The weak circular repetition threshold over large alphabets*, RAIRO – Theoretical Informatics and Applications **54**, Article 6, 2020. [DOI](#) [arXiv](#)

16. L. Mol, [M. J. H. Murphy](#), and O. R. Oellermann, *The threshold dimension of a graph*, Discrete Applied Mathematics **287**, 118–133 (2020). [DOI](#) [arXiv](#)
15. J. I. Brown and L. Mol, *On the roots of the subtree polynomial*, European Journal of Combinatorics **89**, Article 103181 (2020). [DOI](#) [arXiv](#)
14. J. D. Currie, L. Mol, and N. Rampersad, *The repetition threshold for binary rich words*, Discrete Mathematics and Theoretical Computer Science **22**(1), Article 6 (2020). [DOI](#) [arXiv](#)
13. J. D. Currie, L. Mol, and N. Rampersad, *The number of threshold words on n letters grows exponentially for every $n \geq 27$* , Journal of Integer Sequences **23**(3), Article 20.3.1 (2020). [DOI](#) [arXiv](#)
12. [K. J. Balodis](#), [M. E. Kroeker](#), L. Mol, and O. R. Oellermann, *On the mean order of connected induced subgraphs of block graphs*, Australasian Journal of Combinatorics **76**(1), 128–148 (2020). [DOI](#) [arXiv](#)
11. L. Mol, N. Rampersad, J. Shallit, and M. Stipulanti, *Cobham’s theorem and automaticity*, International Journal of Foundations of Computer Science **30**(8), 1363–1379 (2019). [DOI](#) [arXiv](#)
10. L. Mol and O. R. Oellermann, *Maximizing the mean subtree order*, Journal of Graph Theory, **91**(4), 326–352 (2019). [DOI](#) [arXiv](#)
9. J. D. Currie, L. Mol, and N. Rampersad, *Circular repetition thresholds on some small alphabets: Last cases of Gorbunova’s conjecture*, Electronic Journal of Combinatorics **26**(2), Article P2.31 (2019). [DOI](#) [arXiv](#)
8. J. I. Brown, L. Mol, and O. R. Oellermann, *On the roots of Wiener polynomials of graphs*, Discrete Mathematics **341**(9), 2398–2408 (2018). [DOI](#) [arXiv](#)
7. J. D. Currie, L. Mol, and N. Rampersad, *Avoidance bases for formulas with reversal*, Theoretical Computer Science **738**, 25–41 (2018). [DOI](#) [arXiv](#)
6. [M. E. Kroeker](#), L. Mol, and O. R. Oellermann, *On the mean connected induced subgraph order of cographs*, Australasian Journal of Combinatorics **71**(1), 161–183 (2018). [DOI](#) [arXiv](#)
5. J. D. Currie, L. Mol, and N. Rampersad, *On avoidability of formulas with reversal*, RAIRO – Theoretical Informatics and Applications **51**, 181–189 (2018). [DOI](#) [arXiv](#)

4. J. I. Brown and L. Mol, *The shape of node reliability*, Discrete Applied Mathematics **238**, 41–55 (2018). DOI [arXiv](#)
3. J. D. Currie, L. Mol, and N. Rampersad, *A family of formulas with reversal of high avoidability index*, International Journal of Algebra and Computation **27**(5), 477–494 (2017). DOI [arXiv](#)
2. J. I. Brown and L. Mol, *On the roots of all-terminal reliability polynomials*, Discrete Mathematics **340**(6), 1287–1299 (2017). DOI [arXiv](#)
1. J. I. Brown and L. Mol, *On the roots of the node reliability polynomial*, Networks **68**(3), 238–246 (2016). DOI [arXiv](#)

Refereed Conference Proceedings

1. J. D. Currie and L. Mol, *The undirected repetition threshold*, WORDS 2019: Proceedings of the 12th International Conference on Words (LNCS 11682), 145–158 (2019). DOI [arXiv](#)

Preprints Accepted for Publication

1. L. Mol and N. Rampersad, *Lengths of extremal square-free ternary words*, accepted to Contributions to Discrete Mathematics, November 2020. [arXiv](#)

Preprints Submitted for Publication

1. L. Mol, O. R. Oellermann, and V. Oswal, *On average (edge-)connectivity of minimally k -(edge-)connected graphs*, June 2021. [arXiv](#)

Undergraduate Supervision

5. Thomas Czyzowicz, Summer 2021.
4. Matthew Murphy, Summer 2019 (co-supervised with Ortrud Oellermann).
3. Vibhav Oswal, Summer 2019 (co-supervised with Ortrud Oellermann).
2. Kristaps Balodis, Summer 2018 (co-supervised with Ortrud Oellermann).
1. Matthew Kroeker, Summer 2017 (co-supervised with Ortrud Oellermann).

Conference Talks

15. *The mean subtree order of graphs under edge addition*, Average Graph Parameters Minisymposium, Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), online, May 2021. [Slides](#)
14. *The threshold dimension of a graph*, Graph Theory Session, CMS Winter Meeting, online, December 2020. [Slides](#)
13. *The repetition threshold for binary rich words*, AMS Special Session on Sequences, Words, and Automata, Joint Mathematics Meetings, Denver, Colorado, January 2020. [Slides](#)
12. *The undirected repetition threshold*, WORDS 2019, Loughborough University, September 2019. [Slides](#)
11. *The threshold dimension of a graph*, East Coast Combinatorics Conference, St. Francis Xavier University, August 2019. [Slides](#)
10. *The mean subtree order and the mean connected induced subgraph order*, Average Graph Parameters Minisymposium, Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Simon Fraser University, May 2019. [Slides](#)
9. *The subtree polynomial*, Graph Polynomials Minisymposium, Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Simon Fraser University, May 2019. [Slides](#)
8. *The circular repetition threshold for small alphabets*, Prairie Discrete Math Workshop, Brandon University, June 2018. [Slides](#)
7. *Circular repetition thresholds for small alphabets*, SIAM Conference on Discrete Mathematics, University of Colorado Denver, June 2018. [Slides](#)
6. *On the roots of Wiener polynomials of graphs*, Graph Polynomials Minisymposium, SIAM Conference on Discrete Mathematics, University of Colorado Denver, June 2018. [Slides](#)
5. *Maximizing mean subtree order for classes of trees*, Average Graph Parameters Minisymposium, Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Ryerson University, June 2017. [Slides](#)

4. *Roots of all-terminal reliability and node reliability polynomials*, Graph Polynomials Minisymposium, Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Ryerson University, June 2017. [Slides](#)
3. *Shape of the node reliability polynomial*, East Coast Combinatorics Conference, Mount Allison University, July 2015.
2. *Shape and roots of the node reliability polynomial*, Canadian Mathematical Society Summer Meeting, University of Prince Edward Island, June 2015.
1. *On the uniformity dimension of hypergraphs*, Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Memorial University of Newfoundland, June 2013.

Seminar Talks

7. *Extremal square-free words and variations*, One World Combinatorics on Words Seminar, online, June 2020. [Slides](#) [Video](#)
6. *The repetition threshold for binary rich words*, University of Winnipeg Mathematics Seminar, University of Winnipeg, September 2019. [Slides](#)
5. *Maximizing the mean subtree order*, Dalhousie University Graph Theory Seminar, Dalhousie University, May 2017.
4. *Maximizing the mean subtree order*, University of Winnipeg Mathematics Seminar, University of Winnipeg, May 2017.
3. *A family of patterns with reversal with interesting avoidance properties*, University of Winnipeg Mathematics Seminar, University of Winnipeg, November 2016.
2. *The shape of the node reliability polynomial*, Dalhousie University Graph Theory Seminar, Dalhousie University, September 2015.
1. *On independence polynomials of Cartesian product graphs*, Dalhousie University Graph Theory Seminar, Dalhousie University, February 2014.

Organization

- Average Graph Parameters Minisymposium (Parts I and II), Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Simon Fraser University, May 2019 (co-organized with Ortrud Oellermann).
- Average Graph Parameters Minisymposium, Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Ryerson University, June 2017 (co-organized with Ortrud Oellermann).

Workshops Attended

- Measuring the Connectedness of Graphs and Digraphs, focussed research group at Banff International Research Station, August 2018.
Other participants: Peter Dankelmann, Wayne Goddard, Rocio Moreno Casablanca, and Ortrud Oellermann
- WestGrid Research Computing Summer School, University of Manitoba, June 2018.

Journal Review Activities

The number of articles reviewed for each of the following journals is in parentheses.

- Advances in Applied Mathematics (1)
- Ars Combinatoria (2)
- Discrete Applied Mathematics (2)
- Discrete Mathematics (2)
- Discrete Mathematics and Theoretical Computer Science (1)
- European Journal of Combinatorics (1)
- Graphs and Combinatorics (2)
- IEEE Transactions on Information Theory (1)
- Journal of Combinatorial Theory, Series B (1)
- Journal of Graph Theory (1)

- Journal of Integer Sequences (1)
- Networks (5)
- WORDS 2019 Conference (2)

Teaching

Student ratings of instruction, wherever they are available, are accessible by clicking the links. Note that student ratings of instruction were not collected in the Winter 2020 term due to the global pandemic.

University of Winnipeg

- Introduction to Calculus II: [Winter 2021](#).
- Cryptography and Other Applications of Algebra: [Winter 2021](#).
- Applied Mathematics for Business and Administration: Winter 2020 (two sections), [Fall 2020](#), [Winter 2021](#).
- Intermediate Calculus I: [Fall 2020](#).
- Linear Algebra I: [Fall 2020](#).
- Introduction to Calculus I: [Winter 2017](#), [Winter 2018](#), Winter 2020.
- Mathematics Access II: [Winter 2019](#).
- Basic Calculus: [Fall 2018](#).
- Discrete Mathematics: [Fall 2017](#).

Dalhousie University

- Differential and Integral Calculus II: [Summer 2014](#), [Summer 2016](#).
- Mathematics For Commerce: [Fall 2013](#), [Summer 2015](#), [Fall 2015](#), [Winter 2016](#).

Teaching Assistantship

Dalhousie University

- Engineering Mathematics I: Fall 2011, Fall 2012, Fall 2013, Fall 2015.
- Engineering Mathematics II: Winter 2012, Winter 2013, Winter 2014.

Mount Allison University

- Calculus I: Fall 2008, Fall 2009, Fall 2010.
- Calculus II: Winter 2009, Winter 2010, Winter 2011.
- Discrete Structures: Fall 2010.

Teaching Workshops Attended

- First Year University Mathematics Across Canada: Time to Rethink our Curriculum?, University of Alberta, May 2019.
- First Year University Mathematics Across Canada: Facts, Community and Vision, Fields Institute, April 2018.

Course Development and Administration

University of Winnipeg

- Course leader, two sections of Applied Mathematics for Business and Administration, Winter 2021.
- Course leader, three sections of Applied Mathematics for Business and Administration, Fall 2020.
- Pilot for the new course Applied Mathematics for Business and Administration, Winter 2020.

Dalhousie University

- Development of math diagnostic test (on MAA WeBWorK) for entering students, Winter 2016.
- Development of online assessments (on MAA WeBWorK) for Differential and Integral Calculus I and II, Winter 2016.

Departmental Service*University of Winnipeg*

- Member, Departmental Seminar Committee, Department of Mathematics and Statistics, 2020–2021.
- Member, Departmental Curriculum Committee, Department of Mathematics and Statistics, 2020–2021.

Dalhousie University

- Member, First Year Calculus Committee, Department of Mathematics and Statistics, Winter 2016.

Mathematical Outreach Activities

- Speaker in the UWinnipeg Retirement Lecture Series, Portsmouth Retirement Residence, Winnipeg, November 2019.
 - Gave an interactive talk: *The Monty Hall Problem: How to be as smart as a pigeon and win a car*
- Volunteer at Science Rendezvous, University of Manitoba, May 2019.
 - Demonstrator at the UWinnipeg Math/Stats booth.
- Speaker at Grade 11 Math/Stats Day, University of Winnipeg, April 2019.
 - Gave a short presentation on the Monty Hall Problem to prospective students.
- Supervisor at Archimedes Math Schools, Winnipeg, 2018 – 2020.

- Supervised a team of 8–10 teachers at an after-school math program for children in grades 4–9 (approximately 110 students per year).
- Speaker in the Canadian Mathematical Society Summer Camp, Dalhousie University, Summer 2015 and Summer 2016.
 - Gave an interactive talk: *Party in Königsberg - BYOG (Bring Your Own Graphs)*
- Workshop facilitator and member of presentation team, Nova Scotia Math Circles, 2014 – 2016.
 - Gave enrichment presentations to students in grades 1–12 in schools across Nova Scotia.

Selected Scholarships and Awards

- Alexander Graham Bell Canada Graduate Scholarship, Doctoral (NSERC), \$35,000/year for three years, Dalhousie University, 2012-2015.
- President's Award, approximately \$5,000/year for two years, Dalhousie University, 2012-2014.
- Canada Graduate Scholarship, \$17,500/year for one year, Master's (NSERC), Dalhousie University, 2011-2012.
- Governor General's Silver Medal, Mount Allison University, 2011.