Lucas Mol

Curriculum Vitae

Personal Details

Citizenship	Canadian
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Education

2012–2016	**Ph.D. in Mathematics**, *Dalhousie University*, Halifax, NS
	Thesis: On connectedness and graph polynomials, DalSpace
	Supervisor: Jason I. Brown
2011–2012	**M.Sc. in Mathematics**, *Dalhousie University*, Halifax, NS
	Thesis: On the uniformity dimension of hypergraphs, DalSpace
	Supervisor: Jason I. Brown
2007–2011	**B.Sc. Honours in Mathematics**, *Mount Allison University*, Sackville, NB

Experience

2021–Present	**Assistant Teaching Professor** (tenure-track), *Department of Mathematics and Statistics*, Thompson Rivers University, Kamloops, BC
2020–2021	**Assistant Professor** (one-year term), *Department of Mathematics and Statistics*, University of Winnipeg, Winnipeg, MB
2019–2020	**Senior Research Associate**, *Department of Mathematics and Statistics*, University of Winnipeg, Winnipeg, MB
	Supervisors: James D. Currie, Ortrud R. Oellermann, and Narad Rampersad
2016–2019	**Postdoctoral Fellow**, *Department of Mathematics and Statistics*, University of Winnipeg, Winnipeg, MB
	Supervisors: James D. Currie, Ortrud R. Oellermann, and Narad Rampersad

Adjunct Appointments

2020–2023	**Adjunct Professor** (three-year term), *Department of Applied Computer Science*, University of Winnipeg, Winnipeg, MB

Grants, Scholarships, and Awards

2021–2026	**NSERC Discovery Grant**, $90,000 ($18,000/year)
	Title: Repetitions in Words – Branching out from Dejean's Theorem
2021	**NSERC Discovery Launch Supplement**, $12,500
2012–2015	**NSERC Alexander Graham Bell Canada Graduate Scholarship** (Doctoral), $105,000 ($35,000/year)
2012–2014	**Dalhousie University President's Award**, $10,000 ($5,000/year)
2011–2012	**NSERC Canada Graduate Scholarship** (Master's), $17,500
2011	**Governor General's Silver Medal**, *Mount Allison University*

Student Supervision

Thompson Rivers University

2023–Present	**Jonathan Andrade**, Undergraduate Honours Project
	Project Title: Avoiding additive powers in words

University of Winnipeg

2021	**Thomas Czyzowicz**, Undergraduate Summer Research Project
	Project Title: The average order of dominating sets in graphs
2019	**Matthew Murphy**, Undergraduate Summer Research Project
	Project Title: The threshold dimension of a graph
	Co-supervisor: Ortrud Oellermann
2019	**Vibhav Oswal**, Undergradaduate Summer Research Project supported by a MITACS Globalink Scholarship
	Project Title: Average connectivity of minimally k-connected graphs
	Co-supervisor: Ortrud Oellermann
2018	**Kristaps Balodis**, Undergraduate Summer Research Project
	Project Title: The mean connected induced subgraph order of block graphs
	Co-supervisor: Ortrud Oellermann
2017	**Matthew Kroeker**, Undergraduate Summer Research Project supported by an NSERC USRA
	Project Title: The mean connected induced subgraph order of cographs
	Co-supervisor: Ortrud Oellermann

Publications

Names of students are coloured Blue.

27. A. Baranwal, J. D. Currie, L. Mol, P. Ochem, N. Rampersad, and J. Shallit, *Antisquares and critical exponents*, Discrete Mathematics and Theoretical Computer Science **25**(2), Article 11 (2023). DOI arXiv

26. L. Mol, M. J. H. Murphy, and O. R. Oellermann, *The threshold dimension and irreducible graphs*, Discussiones Mathematicae Graph Theory **43**(1), 195–210 (2023).

DOI arXiv

25. 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 **43**, 543–570 (2022). DOI arXiv

24. L. Mol, O. R. Oellermann, and V. Oswal, *On the average (edge-)connectivity of minimally k-(edge-)connected graphs*, Bulletin of the ICA **94**, 95–110 (2022). DOI arXiv

23. L. Mol and N. Rampersad, *Lengths of extremal square-free ternary words*, Contributions to Discrete Mathematics **16**(1), 8–19 (2021). DOI arXiv

22. J. D. Currie and L. Mol, *The undirected repetition threshold and undirected pattern avoidance*, Theoretical Computer Science **866** (2021), 56–69. DOI arXiv

21. B. Cameron and L. Mol, *On the mean subtree order of graphs under edge addition*, Journal of Graph Theory **96**(3), 403–413 (2021). 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

Conference Proceedings

2. L. Mol, N. Rampersad, and J. Shallit, *Dyck words, pattern avoidance, and automatic sequences*, WORDS 2023: Proceedings of the 14th International Conference on Words (LNCS 13899), 220–232 (2023). DOI arXiv

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 Submitted for Publication

1. J. D. Currie, L. Mol, N. Rampersad, and J. Shallit, *Extending Dekking's construction of an infinite binary word avoiding abelian 4-powers*, preprint, November 2021. arXiv

Conference Talks

2023   **WORDS 2023**, *Dyck words, pattern avoidance, and automatic sequences*, Umeå Universitet, Umeå, Sweden, Slides

        CanaDAM 2023, *Avoiding additive powers in words*, University of Winnipeg, Slides

        Coast Combinatorics Conference, *Avoiding additive powers in words*, Simon Fraser University, Slides

2022   **CMS Summer Meeting** (Graph Theory Session), *On connectivity of orientations of graphs*, Memorial University of Newfoundland, Slides

2021   **CanaDAM 2021** (Average Graph Parameters Minisymposium), *The mean subtree order of graphs under edge addition*, online, Slides

2020   **CMS Winter Meeting** (Graph Theory Session), *The threshold dimension of a graph*, online, Slides

        Joint Mathematics Meetings (AMS Special Session on Sequences, Words, and Automata), *The repetition threshold for binary rich words*, Denver, CO, Slides

2019   **WORDS 2019**, *The undirected repetition threshold*, Loughborough University, Loughborough, UK, Slides

        East Coast Combinatorics Conference, *The threshold dimension of a graph*, St. Francis Xavier University, Slides

        CanaDAM 2019 (Average Graph Parameters Minisymposium), *The mean subtree order and the mean connected induced subgraph order*, Simon Fraser University, Slides

        CanaDAM 2019 (Graph Polynomials Minisymposium), *The subtree polynomial*, Simon Fraser University, Slides

2018   **Prairie Discrete Math Workshop**, *The circular repetition threshold for small alphabets*, Brandon University, Slides

        SIAM Conference on Discrete Mathematics, *Circular repetition thresholds for small alphabets*, University of Colorado, Denver, CO, Slides

        SIAM Conference on Discrete Mathematics (Graph Polynomials Minisymposium), *On the roots of Wiener polynomials of graphs*, University of Colorado, Denver, CO, Slides

2017   **CanaDAM 2017** (Average Graph Parameters Minisymposium), *Maximizing mean subtree order for classes of trees*, Ryerson University, Slides

        CanaDAM 2017 (Graph Polynomials Minisymposium), *Roots of all-terminal reliability and node reliability polynomials*, Ryerson University, Slides

2015   **East Coast Combinatorics Conference**, *Shape of the node reliability polynomial*, Mount Allison University

CMS Summer Meeting, *Shape and roots of the node reliability polynomial*, University of Prince Edward Island

2013 **CanaDAM 2013**, *On the uniformity dimension of hypergraphs*, Memorial University of Newfoundland

Seminar Talks

2023 **TRU Mathematics and Statistics Seminar**, *Dyck words, pattern avoidance, and automatic sequences*, Thompson Rivers University, Slides

UTU Mathmematics Seminar, *The repetition threshold for binary rich words*, University of Turku, Turku, Finland, Slides

TRU Mathematics and Statistics Seminar, *Avoiding additive powers in words*, Thompson Rivers University, Slides

Atlantic Graph Theory Seminar, *Avoiding additive powers in words*, Dalhousie University (online), Slides

2022 **CBU Mathematics Seminar**, *Square-free words: Theme and variations*, Cape Breton University, Slides

2021 **TRU Mathematics and Statistics Seminar**, *Square-free words: Theme and variations*, Thompson Rivers University, Slides

2020 **One World Combinatorics on Words Seminar**, *Extremal square-free words and variations*, online, Slides, Video

2019 **UWinnipeg Mathematics and Statistics Seminar**, *The repetition threshold for binary rich words*, University of Winnipeg, Slides

2017 **Atlantic Graph Theory Seminar**, *Maximizing the mean subtree order*, Dalhousie University

UWinnipeg Mathematics and Statistics Seminar, *Maximizing the mean subtree order*, University of Winnipeg

2016 **UWinnipeg Mathematics and Statistics Seminar**, *A family of patterns with reversal with interesting avoidance properties*, University of Winnipeg

2015 **Atlantic Graph Theory Seminar**, *The shape of the node reliability polynomial*, Dalhousie University

2014 **Atlantic Graph Theory Seminar**, *On independence polynomials of Cartesian product graphs*, Dalhousie University

Minisymposium Organization

2019 **CanaDAM 2019**, *Average Graph Parameters Minisymposium (Parts I and II)*, Simon Fraser University
Co-organizer: Ortrud Oellermann

2017 **CanaDAM 2017**, *Average Graph Parameters Minisymposium*, Ryerson University
Co-organizer: Ortrud Oellermann

Journal Review Activities

Advances in Applied Mathematics (1)

Ars Combinatoria (2)

Combinatorial Theory (1)

Discrete Applied Mathematics (2)

Discrete Mathematics (3)

Discrete Mathematics and Theoretical Computer Science (2)

Electronic Journal of Combinatorics (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 Combinatorics (1)

Journal of Graph Theory (4)

Journal of Integer Sequences (1)

Networks (6)

WORDS 2019 Conference (2)

Other Review Activities

Mathematical Reviews (4)

External Reviewer for NSERC Discovery Grant (1)

Teaching

Wherever available, student evaluations are accessible by clicking the course number.

Thompson Rivers University

Fall 2023	MATH 1170: Calculus for Business and Economics
	MATH 1700: Discrete Mathematics 1
Winter 2023	MATH 1140: Calculus 1
	MATH 1700: Discrete Mathematics 1
	MATH 3030: Introduction to Stochastic Processes
	MATH 4980: Directed Studies in Mathematics (Game Theory)
Fall 2022	MATH 1140: Calculus 1
	MATH 1170: Calculus for Business and Economics
	MATH 3020: Introduction to Probability
Winter 2022	MATH 1070: Mathematics for Business and Economics
	MATH 1170: Calculus for Business and Economics

	MATH 4430: Introduction to Graph Theory
Fall 2021	MATH 1070: Mathematics for Business and Economics
	MATH 1140: Calculus 1
	MATH 1170: Calculus for Business and Economics

University of Winnipeg

Winter 2021	MATH-1104: Introduction to Calculus II
	MATH-1301: Applied Mathematics for Business and Administration
	MATH-2202: Cryptography and Other Applications of Algebra
Fall 2020	MATH-1201: Linear Algebra I
	MATH-1301: Applied Mathematics for Business and Administration
	MATH-2105: Intermediate Calculus I
Winter 2020	MATH-1103: Introduction to Calculus I
	MATH-1301: Applied Mathematics for Business and Administration (two sections)
	Note: No student evaluations university-wide in Winter 2020 due to the global pandemic
Winter 2019	MATH-0042: Mathematics Access II
Fall 2018	MATH-1102: Basic Calculus
Winter 2018	MATH-1103: Introduction to Calculus I
Fall 2017	MATH-1401: Discrete Mathematics
Winter 2017	MATH-1103: Introduction to Calculus I

Dalhousie University

Summer 2016	MATH 1010: Differential and Integral Calculus II
Winter 2016	MATH 1115: Mathematics For Commerce
Fall 2015	MATH 1115: Mathematics For Commerce
Summer 2015	MATH 1115: Mathematics For Commerce
Summer 2014	MATH 1010: Differential and Integral Calculus II
Fall 2013	MATH 1115: Mathematics For Commerce

Teaching Assistantship

Dalhousie University

Fall 2015	MATH 1280: Engineering Mathematics I
Winter 2014	MATH 1290: Engineering Mathematics II
Fall 2013	MATH 1280: Engineering Mathematics I
Winter 2013	MATH 1290: Engineering Mathematics II
Fall 2012	MATH 1280: Engineering Mathematics I
Winter 2012	MATH 1290: Engineering Mathematics II
Fall 2011	MATH 1280: Engineering Mathematics I

Mount Allison University

Winter 2011	MATH 1121: Calculus II
Fall 2010	MATH 1111: Calculus I
	MATH 2211: Discrete Structures
Winter 2010	MATH 1121: Calculus II
Fall 2009	MATH 1111: Calculus I
Winter 2009	MATH 1121: Calculus II
Fall 2008	MATH 1111: Calculus I

Workshops Attended

2019	First Year University Mathematics Across Canada: Time to Rethink our Curriculum?, University of Alberta
2018	Measuring the Connectedness of Graphs and Digraphs, focussed research group at Banff International Research Station
	Other participants: Peter Dankelmann, Wayne Goddard, Rocio Moreno Casablanca, Ortrud Oellermann
2018	WestGrid Research Computing Summer School, University of Manitoba
2018	First Year University Mathematics Across Canada: Facts, Community and Vision, Fields Institute

Committee Memberships

Thompson Rivers University

2023–Present	**Science Social and Culture Committee**, *Faculty of Science*
2022–Present	**Recruitment and Retention Committee**, *Department of Mathematics and Statistics*
2021–Present	**Curriculum Committee**, *Department of Mathematics and Statistics*

University of Winnipeg

2020–2021	**Seminar Committee**, *Department of Mathematics and Statistics*
2020–2021	**Curriculum Committee**, *Department of Mathematics and Statistics*

Dalhousie University

2016	**First Year Calculus Committee**, *Department of Mathematics and Statistics*

Volunteer and Mathematical Outreach Activities

2022–Present	**Co-organizer**, *BC Secondary School Math Contest*, Thompson Rivers University
	Co-organizers: Shirin Boroushaki and Suzanne Feldberg

- In 2023, we had 256 students from 13 schools participate in the preliminary round at their schools, and 53 students from 10 schools participate in the final round at TRU.
- In 2022, we had 153 students from 10 schools participate in the preliminary round at their schools, and 40 students from 8 schools participate in the final round at TRU.

2021–Present **Volunteer Tutor**, *Math Help Centre*, Thompson Rivers University
Volunteered 1–2 hours per week in the Fall and Winter semesters.

2018–2020 **Supervisor**, *Archimedes Math Schools*, Winnipeg, MB
Supervised a team of 8–10 teachers at an after-school math program for children in grades 4–9 (approximately 100 students per year).

2014–2016 **Workshop facilitator and member of presentation team**, *Nova Scotia Math Circles*, Dalhousie University
Gave enrichment presentations to students in grades 1–12 in schools across Nova Scotia (approximately 10 high school visits per year).

Outreach Talks

2019 **UWinnipeg Retirement Lecture Series**, *The Monty Hall Problem: How to be as smart as a pigeon and win a car*, Portsmouth Retirement Residence

2015, 2016 **CMS Summer Camp**, *Party in Königsberg – BYOG (Bring Your Own Graphs)*, Dalhousie University