

# J. Daniel Christensen

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The University of Western Ontario  
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## RESEARCH INTERESTS

Algebraic topology (especially stable homotopy theory and model categories), homotopy type theory, derived categories, modular representation theory, mathematical physics (quantum gravity), computation, and category theory.

## EXPERIENCE

### **The University of Western Ontario, Department of Mathematics** — 2000 to present

Professor, July 1, 2010 to present.  
Associate Professor, July 1, 2004 to June 30, 2010.  
Assistant Professor, July 1, 2000 to June 30, 2004.  
Cross-appointed to Applied Mathematics.

### **The Perimeter Institute for Theoretical Physics** — 2001 to present

Affiliate Member.

### **Institute for Advanced Study, School of Mathematics** — 1999 to 2000

Member. Participated in Voevodsky's program on the homotopy theory of schemes.

### **Johns Hopkins University, Department of Mathematics** — 1997 to 2000

Assistant Professor. On leave at IAS during 1999–2000 academic year.

## EDUCATION

### **Massachusetts Institute of Technology** — 1992 to 1997

Ph.D. in Mathematics, June 1997, with Haynes R. Miller.  
Thesis: Ideals in triangulated categories: phantoms, ghosts and skeleta.

### **University of Waterloo** — 1987 to 1992

Joint Honours Bachelor of Mathematics degree in Pure and Applied Mathematics.

## PREPRINTS AND WORK IN PROGRESS

40. Functorial connections between the representation theory of the symmetric and unitary groups. Work in progress.
39. A characterization of univalent fibrations. Work in progress.
38. Diffeological vector spaces, with Enxin Wu. Work in progress.

## PAPERS SUBMITTED FOR PUBLICATION

37. Counterexamples to conjectures about Subset Takeaway and counting linear extensions of a Boolean lattice, with Andries E. Brouwer. Submitted. 4 pages. <http://arxiv.org/abs/1702.03018>

## PUBLICATIONS

36. Higher Toda brackets and the Adams spectra sequence in triangulated categories, with Martin Frankland. To appear in *Algebraic & Geometric Topology*. 37 pages. <http://arxiv.org/abs/1510.09216>
35. Tangent spaces of bundles and of filtered diffeological spaces, with Enxin Wu. *Proceedings of the AMS*, **145**(5) (2017), 2255–2270.
34. Tangent spaces and tangent bundles for diffeological spaces, with Enxin Wu. *Cahiers de Topologie et Géométrie Différentielle Catégoriques*, **57**(1) (2016), 3–50.

33. The homotopy theory of diffeological spaces, with Enxin Wu. *New York J. Math.* **20** (2014), 1269–1303.
32. Ghost numbers of group algebras II, with Gaohong Wang. *Algebras and Representation Theory* **18**(3) (2015), 849–880.
31. The  $D$ -topology for diffeological spaces, with J. Gord Sinnamon and Enxin Wu. *Pacific Journal of Mathematics* **272**(1) (2014), 87–110.
30. Ghost numbers of group algebras, with Gaohong Wang. *Algebras and Representation Theory* **18**(1) (2015), 1–33, doi:10.1007/s10468-014-9476-9.
29. Freyd’s generating hypothesis for groups with periodic cohomology, with Sunil Chebolu and Ján Mináč. *Canadian Mathematical Bulletin* **55**(1) (2012), 48–59.
28. The sub-leading asymptotic behaviour of area correlations in the Barrett-Crane model, with Igor Khavkine, Etera Livine and Simone Speziale. *Class. Quantum Grav.* **27** (2010), 035012, 19 pages.
27. A Dual Non-abelian Yang-Mills Amplitude in Four Dimensions, with J. Wade Cherrington. *Nuclear Physics B* **813**(3) (2009), 370–382.
26. Numerical evidence of regularized correlations in spin foam gravity, with Etera R. Livine and Simone Speziale. *Physics Letters B* **670**(4-5) (2009), 403–406.
25. Eigentheory of Cayley-Dickson algebras, with Daniel Biss, Dan Dugger and Daniel Isaksen. *Forum Mathematicum* **21**(5) (2009), 833–851.
24. J. Michael Boardman, J. Daniel Christensen, Donald M. Davis, Haynes R. Miller and Jack Morava, eds. *Complex cobordism in homotopy theory: its impact and prospects*. Homology, Homotopy and Applications **10**(3) (2008), 368+xix pp. International Press, Somerville, MA.
23. Ghosts in modular representation theory, with Sunil Chebolu and Ján Mináč. *Advances in Mathematics* **217**(6) (2008), 2782–2799.
22. Groups which do not admit ghosts, with Sunil Chebolu and Ján Mináč. *Proceedings of the AMS*, **136**(4) (2008), 1171–1179.
21. Dual computations of non-abelian Yang-Mills on the lattice, with J. Wade Cherrington and Igor Khavkine. *Physics Review D* **76** 094503 (2007), 17 pages.
20. Large annihilators in Cayley-Dickson algebras II, with Daniel Biss, Daniel Dugger and Daniel Isaksen. *Boletín de la Sociedad Matemática Mexicana (3)* **13**(2) (2007), 269–292.
19.  $q$ -deformed spin foam models of quantum gravity, with Igor Khavkine. *Classical and Quantum Gravity* **24** (2007), 3271–3290.
18. Luchezar L. Avramov, J. Daniel Christensen, William G. Dwyer, Michael A. Mandell and Brooke E. Shipley, eds. *Interactions between Homotopy Theory and Algebra*. Contemporary Math. **436** (2007), 334pp. Amer. Math. Soc., Providence, RI.
17. The generating hypothesis for the stable module category of a  $p$ -group, with Dave Benson, Sunil Chebolu and Ján Mináč. *J. Algebra* **310**(1) (2007), 428–433.
16. Finiteness of Lorentzian  $10j$  symbols and partition functions. *Classical and Quantum Gravity* **23** (2006), 1679–1687.
15. Positivity in Lorentzian Barrett-Crane models of quantum gravity, with J. Wade Cherrington. *Classical and Quantum Gravity* **23** (2006), 721–736.
14. Causal sites as quantum geometry, with Louis Crane. *J. Math. Physics* **46** (2005), 122502, 17 pages.
13. Duality and pro-spectra, with Daniel C. Isaksen. *Algebraic & Geometric Topology* **4** (2004), 781–812.
12. Obstruction theory in model categories, with Daniel C. Isaksen and William G. Dwyer. *Advances in Mathematics* **181** (2004), 396–416.
11. Asymptotics of  $10j$  symbols, with John C. Baez and Greg Egan. *Classical and Quantum Gravity* **19** (2002), 6489–6513.

10. Spin foam models of Riemannian quantum gravity, with John C. Baez, Thomas R. Halford and David C. Tsang. *Classical and Quantum Gravity* **19** (2002), 4627–4648.
9. Quillen model structures for relative homological algebra, with Mark Hovey. *Math. Proc. Cambridge Philos. Soc.* **133 Part 2** (2002), 261–293.
8. Positivity of spin foam amplitudes, with John C. Baez. *Classical and Quantum Gravity* **19** (2002), 2291–2305.
7. An efficient algorithm for the Riemannian  $10j$  symbols, with Greg Egan. *Classical and Quantum Gravity* **19** (2002), 1184–1193.
6. Failure of Brown representability in derived categories, with Bernhard Keller and Amnon Neeman. *Topology* **40** (2001), 1339–1361.
5. Phantom maps and chromatic phantom maps, with Mark Hovey. *American Journal of Mathematics* **122** (2000), 275–293.
4. Ideals in triangulated categories: phantoms, ghosts and skeleta. *Advances in Mathematics* **136** (1998), 284–339.
3. Phantom maps and homology theories, with Neil P. Strickland. *Topology* **37** (1998), 339–364.
2. David Gale’s subset take-away game, with Mark Tilford. *American Mathematical Monthly* **104** (1997), 762–766.
1. The causal structure of two-dimensional spacetimes, with Robert B. Mann. *Classical and Quantum Gravity* **9** (1992), 1769–1786.

AWARDS AND GRANTS SINCE 1997 (IN CANADIAN DOLLARS)

- NSERC Discovery Grant, April 2016 to April 2021, \$20,000/year.
- PIMS grant to support a workshop on Homotopy Type Theory and Univalent Foundations, May 2016, \$5,000.
- Faculty of Science grant to support a workshop on Homotopy Type Theory and Univalent Foundations, May 2016, \$2,250.
- AARMS grant to support a workshop on Homotopy Type Theory and Univalent Foundations, May 2016, \$2,000.
- NSF grant to support a workshop on Homotopy Type Theory and Univalent Foundations, May 2016, \$13,750.
- Fields Institute grant to support a workshop on Homotopy Type Theory and Univalent Foundations, May 2016, \$18,000.
- NSERC Discovery Grant, April 2011 to April 2016, \$26,000/year.
- University of Western Ontario Florence Bucke Science Prize, 2010.
- University of Western Ontario Faculty Scholar Award, 2008–2010. \$7000/year.
- SHARCNet Graduate Student Funding, 2008, \$8,000.
- Faculty of Science Postdoctoral Funding, 2007–2011, \$31,000/year.
- Faculty of Science Distinguished Research Professor, 2007–2008.
- NSERC operating grant, April 2006 to April 2011, \$18,000/year.
- Fields Institute grant to support a Fields Institute Program on Geometric Applications of homotopy theory, January to June 2007, \$250,000 (with Rick Jardine).
- SHARCNet Graduate Student Funding, 2003 to 2005, \$27,720.
- Fields Institute grant to support a Fields Institute Program in Applied Homotopy Theory, held at Western, September 2003, \$42,500 (with Rick Jardine).
- NSERC equipment grant for Beowulf cluster, 2002, \$12,000 (with Stu Rankin).
- Academic Development Fund Small Grant for Beowulf cluster, 2002, \$7475.
- SHARCNET Research Fellowship, 2002 to 2003, \$18,000.
- Premier’s Research Excellence Award, 2001 to 2006, \$150,000.

SHARCNet fellowship for undergraduate research using parallel computation, May 2001, \$3000.  
Fields Institute grants to support the Ontario Topology Seminar, October 2000 (\$1000) and October 2001 (\$2000) (with Rick Jardine).  
NSERC operating grant, April 2001 to April 2006, \$18,000/year.  
University of Western Ontario Start-up funds, July 2000, \$15,000.  
Offered three year NSF grant May 2000, \$129,000; declined because of move to Canada.  
NSERC Postdoctoral Fellowship, June 1999 to July 2000, \$41,000.  
Johns Hopkins University Grant for travel support, June 1999 to September 1999, \$5700.  
Johns Hopkins University Start-up funds, July 1997 to June 1999, \$6000.

#### SELECTED COMPUTATIONAL WORK

Software for working with posets, used to disprove a conjecture in game theory and compute the number of linear extensions of posets.  
Formal verification of a characterization of univalent fibrations, in Coq.  
Software for computations in modular representation theory (2200 lines of code).  
Study of the graviton propagator in loop quantum gravity (dozens of cpu years).  
Asymptotics of  $10j$  symbols (many cpu years).  
Spin foam models of Riemannian quantum gravity (many cpu months).  
Software for Lorentzian quantum gravity calculations (3000 lines of code).  
Software for Riemannian quantum gravity calculations (6000 lines of code).  
Software for the numerical study of Cayley-Dickson algebras (3400 lines of code).  
Patterns in the roots of integer polynomials (featured in Scientific American, December 2009).  
See <http://jdc.math.uwo.ca/roots>  
Extensive computer experience, including combinatorial and numerical programming, parallel programming (MPI), symbolic algebra, computer graphics, 3D input and output devices, scientific visualization and linux system administration (including a small Beowulf cluster and a Condor network).

#### TALKS

Group theory, one-way functions, spam prevention and digital currency, Undergrad Society of Applied Math Pizza Seminar, UWO, October 2016.  
The Joyal model structure on simplicial sets, Higher categories learning seminar, UWO, September 2016.  
Univalent fibrations in type theory and topology, Colloquium, Wayne State University, April 2016.  
Higher Toda brackets and the Adams spectral sequence, Midwest Topology Seminar, Wayne State University, October 2015.  
A characterization of univalent fibrations, CT2015, Aveiro, Portugal, June 2015.  
Higher inductive types, Homotopy theory seminar, UWO, October 2014.  
Models of (homotopy) type theory, Homotopy theory seminar, UWO, June 2014.  
An introduction to type theory, Homotopy theory seminar, UWO, May 2014.  
The homotopy theory of smooth spaces, Topology Seminar, University of Aberdeen, December 2012. Topology Seminar, University of Copenhagen, May 2013.  
Representations of  $S_k$  and  $U(n)$ , Recent Advances in Topological Quantum Field Theories, Lisbon, September 2012.  
The homotopy theory of diffeological spaces, Algebra Seminar, IST Lisbon, May 2011. Geometry and Topology Seminar, UWO, November 2011. Topology Seminar, Wayne State University, November 2011.

Computation of traces in the representation theory of the symmetric and unitary groups, Algebra Seminar, UWO, February 2011.

A tour of topology: from counting to curvature via bridges and islands, Florence Bucke public lecture, UWO, March 2010.

Milnor basis for the Steenrod algebra, Steenrod Algebra Seminar, UWO, November 2009.

Categories of smooth spaces, Geometry and Topology Seminar, UWO, February 2009.

An introduction to stable homotopy theory, Stable Homotopy Theory Seminar, UWO, January 2009.

Ghosts in modular representation theory, Colloquium, UWO, November 2007. Topology Seminar, MIT, November 2007. Canadian Mathematical Society annual meeting, London, Ontario, December, 2007.

Computations involving spin networks, spin foams, quantum gravity and lattice gauge theory, Loops '07, Mexico, June 2007. International Loop Quantum Gravity Seminar, October 2007, by conference call to Hamburg, Utrecht, Marseilles, Perimeter Institute, Penn State, Louisiana, Mississippi, Warsaw, etc.

Efficient computation in quantum gravity, Colloquium, Queen's, August 2006.

Homotopy cardinality and Euler characteristic, Algebra seminar, KTH, Stockholm, May 2006. Colloquium, Queen's, August 2006.

Using python for scientific computation, UWO, March 2006.

Homotopy cardinality and Euler characteristic, Colloquium, UWO, February 2006. Colloquium, McMaster, February 2006.

Finiteness and positivity for the Lorentzian partition function. Loops '05, Albert-Einstein-Institute, Potsdam, Germany, October 2005.

Simplicial models of quantum gravity. Topology seminar, University of Chicago, May 2003. Topology seminar, UIUC, May 2003.

From games to numbers and beyond. Graduate School Information Day, Fields Institute, November 2002.

Discrete geometry via representation theory. Cascade Topology Seminar/Pacific Northwest Geometry Seminar, University of Washington, May 2002.

Obstruction theory in model categories. American Mathematical Society meeting, Ann Arbor, March 2002.

Discrete geometry and quantum gravity. Bay Area Topology Seminar, Stanford, February 2002.

Efficient computations in quantum gravity. Quantum gravity seminar, University of California, Riverside, November, 2001.

Spin foams, spin networks and quantum gravity. Invited lecture at Algebraic Topological Methods in Computer Science Conference, Stanford University, July, 2001.

Spin foam models of quantum gravity. Western Ontario, April, 2001. Wayne State University, April, 2001.

Pro-spectra and duality. Ontario Topology Seminar, Western Ontario, October, 2000.

Counterexamples to Brown representability using quivers. Representation theory seminar, Bielefeld, June, 2000. Topology seminar, UIUC, May, 2000.

Relative model structures on categories of chain complexes. JAMI conference on Recent Progress in Homotopy Theory, JHU, March, 2000.

Brown representability in derived categories. Joint algebra and topology seminar, Rutgers, March, 2000. Topology seminar, CUNY, February, 2000. Topology seminar, MIT, January, 2000. Topology seminar, JHU, December, 1999.

Efficient constructions of spaces and chain complexes. Texas A&M, Waterloo, Sheffield, Western Ontario, Wesleyan, New Mexico State. February, 2000.

Failure of Brown representability in derived categories. Topology seminar, Princeton University, October, 1999.

Phantom Maps. Homotopy theory seminar, Institute for Advanced Study, October, 1999.

Brown representability in derived categories. Arolla Conference on Algebraic Topology, Switzerland, August, 1999.

Efficient constructions of complexes. National University of Singapore, August, 1999.

The ghost-length of projective spaces. National Research Symposium on Algebraic Geometry and Applications, Australian National University, Canberra, Australia, July, 1999.

Model categories and derived categories. Representation Theory seminar, University of California Santa Barbara, July, 1999.

Projective classes in algebra and topology. Topology seminar, Yale University, March, 1999.

Duality and phantom maps. Series of five lectures at Hebrew University, Jerusalem, January, 1999.

Chromatic phantom maps. Canadian Mathematical Society annual meeting, Kingston, Ontario, December, 1998.

Derived categories and projective classes. Algebra seminar, University of Waterloo, August, 1998. Representation Theory seminar, University of Bielefeld, Germany, June, 1998.

Phantom maps: All or nothing. Barcelona Conference on Algebraic Topology, June, 1998. Topology seminar, MIT, March, 1998.

An introduction to stable homotopy theory. Mathematics Department Colloquium, Wesleyan University, May, 1998.

Derived categories and projective classes. American Mathematical Society meeting, Baltimore, Maryland, January, 1998. Canadian Mathematical Society annual meeting, Victoria, British Columbia, December, 1997.

An introduction to stable homotopy theory. Algebra seminar, Waterloo, March, 1997.

Calculating the ghost-length of real projective spaces. Topology seminar, MIT, February, 1997. Topology seminar, Johns Hopkins University, January, 1997.

Phantom maps and a generalized Milnor sequence. American Mathematical Society annual meeting, San Diego, January, 1997.

Ideals in the stable homotopy category: phantoms, ghosts and skeleta. Ontario Topology Seminar, Fields Institute, Toronto, October, 1996. American Mathematical Society meeting, Lawrenceville, New Jersey, October, 1996.

Ideals in the stable homotopy category. Topology seminar, University of Virginia, April, 1996.

Phantom maps and stable homotopy theory. Topology seminar, Wayne State University, Detroit, March, 1996. Fields Institute stable homotopy theory emphasis session, January, 1996. American Mathematical Society meeting, Kent State, Ohio, November, 1995.

Phantom phenomena in triangulated categories. Category Theory Octoberfest, Montreal, October, 1995.

## SUPERVISION

### Postdoctoral Fellows

Chris Kapulkin, August 2014 to present, homotopy type theory.

Fosco Loregian, August 2016 to November 2016, higher category theory.

Martin Frankland, August 2013 to August 2015, homotopy theory.

Gaohong Wang, November 2014 to April 2015, modular representation theory.

Luke Wolcott, September 2012 to June 2013, homotopy theory.

Enxin Wu, September 2012 to December 2012, homotopy theory.

Wade Cherrington, May 2009 to April 2011, lattice gauge theory.

Sam Isaacson, July 2009 to June 2010, homotopy theory.  
Jeff Morton, July 2007 to June 2010, quantum gravity and category theory.  
Sunil Chebolu, June 2005 to June 2008, homotopy theory and modular representation theory.  
Josh Willis, August 2004 to August 2006, quantum gravity.  
Georg Biederman, August 2004 to August 2006, homotopy theory. (Rick Jardine was chief supervisor).  
Eli Hawkins, August 2004 to August 2005, quantum gravity and non-commutative geometry.  
Boris Chorny, August 2003 to August 2005, homotopy theory. (Rick Jardine was chief supervisor).  
Kristine Bauer, January 2003 to August 2003, homotopy theory.  
Oliver Roendigs, July 2002 to June 2003, homotopy theory.

#### **Ph.D. Students**

Luis Scoccola, September 2016 to present, homotopy theory.  
Marco Verguna, September 2015 to present, homotopy theory.  
James Richardson, September 2015 to present, homotopy theory.  
Gaohong Wang, September 2010 to August 2014. Ph.D. 2014, homotopy theory.  
Enxin Wu, September 2008 to August 2012. Ph.D. 2012, homotopy theory.  
Wade Cherrington, January 2004 to April 2009. Ph.D. 2009, quantum gravity and lattice gauge theory.  
Igor Khavkine, September 2004 to October 2008. Ph.D. 2008, quantum gravity.  
Adkham Abduvaitov, August to December, 2006. Withdrew from Ph.D. program.

#### **M.Sc. Students**

Mitchell Riley, September 2015 to present, M.Sc. in progress, homotopy theory.  
Shiyamalen Thavandiran, September 2015 to present, M.Sc. in progress, homotopy theory.  
Rui Dong, September 2014 to August 2015, M.Sc. 2015, homotopy theory.  
Brendon Phillips, September 2014 to August 2015, M.Sc. 2015, mathematics.  
Alex Murray, September 2013 to August 2014, M.Sc. 2014, mathematics.  
Jianing Huang, September 2013 to August 2014. M.Sc. 2014, mathematics.  
Mingcong Zeng, September 2012 to August 2013. M.Sc. 2013, homotopy theory.  
Brett Bridges, September 2011 to August 2012. M.Sc. 2012, mathematics.  
Banhita Maitra, September 2011 to August 2012. M.Sc. 2012, homotopy theory.  
Girish Kulkarni, September 2011 to August 2012. M.Sc. 2012, homotopy theory.  
Baran Serajelahi, September 2010 to August 2011. M.Sc. 2011, homotopy theory.  
Gaohong Wang, September 2009 to August 2010. M.Sc. 2010, homotopy theory.  
Wade Cherrington, January 2003 to December 2004. M.Sc. 2004, quantum gravity.  
Xiaoqing Xie, May 2003 to May 2005. M.Sc. 2004, mathematics.  
Michael de Jong, January 2003 to December 2004. M.Sc. 2004, quantum gravity.  
Mihai Moise, January 2002 to December 2002. M.Sc. 2002, mathematics.

#### **Undergraduates**

Jason Brennan, NSERC undergraduate research, May to August, 2016, and faculty mentor, January 2017 to present.  
Daniel Satanove, NSERC undergraduate research, May to August, 2015.  
Sarah Dawson, Honors Thesis, Physics, 2013–2014.  
Arya Fallah, work-study program, September, 2003.  
Mike Castellino, work-study program, May to August, 2003.

David Tsang, NSERC undergraduate research, May to August, 2001.

Tom Halford, NSERC undergraduate research, May to August, 2001.

Mark MacDonald, undergraduate research, May to July, 2001.

Amber Loucks, work-study program, January to April, 2001.

### **High School Students**

Mark Tilford, Research Science Institute, MIT, July to August 1995.

### **Graduate Examinations**

Membership on Department of Mathematics Thesis Examining Boards

P. Mathey (Ph.D., 2010).

Z. Luo (Ph.D., 2004).

Extra-Departmental Activity at UWO

Davood Mohajerani (M.Sc. Computer Science, 2015). Extra-departmental examiner for Department of Computer Science.

Hua Meng (M.Sc. Computer Science, 2015). Extradepartmental examiner for Department of Computer Science.

Matthew Teigen (M.F.A. Visual Arts, 2011). University Examiner for Department of Visual Arts.

Junji Jia (Ph.D. Applied Mathematics, 2009). Extradepartmental examiner for Department of Applied Mathematics.

Matt Malenfant (M.Sc. Computer Science, 2007). Extradepartmental examiner for Department of Computer Science.

Laurentin Dragon (Ph.D. Computer Science, 2007). Chairperson of the Oral Examining Board for the Department of Computer Science.

James Marshall (M.Sc. Applied Mathematics, 2007). Extradepartmental examiner for Department of Applied Mathematics.

Xiaoyu Yang (Ph.D. Electrical and Computer Engineering, 2005). Chairperson of the Oral Examining Board for the Department of Electrical and Computer Engineering.

Sergiy Kuzmin (Ph.D. Applied Mathematics, 2002). Extradepartmental examiner for the Department of Applied Mathematics.

External Activity

Yidun Wan (Ph.D. Physics, 2009). External examiner for Department of Physics, University of Waterloo and Perimeter Institute.

## **TEACHING**

### **University of Western Ontario**

Winter 2017: M9052, Algebraic Topology (graduate course), with some students participating by videoconference.

Summer 2016: M9140, Representation Theory (graduate course).

Winter 2016: M9052, Algebraic Topology (graduate course), with some students participating by videoconference.

Fall 2014: M1600, Linear Algebra (coordinating).

Summer 2014: M9140, Representation Theory (graduate course).

Winter 2014: M1600, Linear Algebra (coordinating).

Fall 2013: M1600, Linear Algebra (coordinating).

M9052, Algebraic Topology (graduate course).

Summer 2012: M9140, Representation Theory (graduate course).

Fall 2011: M9052, Algebraic Topology (graduate course).



Winter 2011: M9152, Algebraic Topology II (graduate course).  
 Fall 2010: M9052, Algebraic Topology (graduate course).  
 Winter 2010: M9140, Representation Theory (graduate course).  
           Topics in Homotopy Theory (graduate reading course).  
 Fall 2009: LA1600, Linear Algebra.  
 Winter 2009: LA1600, Linear Algebra.  
           Representation Theory (graduate reading course).  
 Fall 2008: LA1600, Linear Algebra.  
           M9152, Algebraic Topology II (graduate course).  
 Winter 2008: M414, Algebraic Topology (cross-listed as a graduate course).  
 Winter 2007: M562, Representation Theory (graduate course).  
 Fall 2006: Calc250, Multi-variable Calculus, two sections.  
 Fall 2004: Calc250, Multi-variable Calculus.  
 Summer 2004: M546, Homotopy Theory I (graduate course).  
 Winter 2004: M572, Differential Geometry (graduate course).  
 Summer 2003: M562, Representation Theory (graduate course).  
 Fall 2002: M222, Discrete Structures I.  
 Winter 2002: M223, Discrete Structures II.  
           M562, Representation Theory (graduate reading course).  
 Fall 2001: M222, Discrete Structures I, two sections.  
 Winter 2001: M414, Algebraic Topology.  
 Fall 2000: M546, Homotopy Theory I (graduate course).

### **Johns Hopkins University**

Winter 1999: Calculus II, two sections.  
 Fall 1998: Homotopy Theory II (graduate course).  
 Winter 1998: Linear algebra. Homotopy Theory I.  
 Fall 1997: Algebraic topology (graduate course).

### **Massachusetts Institute of Technology**

1995–1996: Recitation Instructor for calculus, linear algebra, and a topics course for sophomores.

### **Teaching Workshops**

May 2003: Attended “Spring Perspectives on Teaching” workshop.  
 Sept 2000: Attended Educational Development Office conference.

## SERVICE

### **External**

Editor and Managing Editor, *Homology, Homotopy and Applications*, September 2005 to present.

### **University of Western Ontario**

2016–2017:

Associate Chair, Graduate, Department of Mathematics.  
 Appointments, Graduate Affairs, Promotion and Tenure and Chair Selection Committees, Department of Mathematics.  
 Science of Information Theme Executive Committee, Faculty of Science.  
 External Awards Committee, Faculty of Science.  
 Co-organizer (with Chris Kapulkin, Dan Licata, Emily Riehl and Mike Shulman) of the AMS Mathematics Research Community on “Homotopy Type Theory,” Snowbird resort Utah, June 4-10, 2017.

2015–2016:

Associate Chair, Graduate, Department of Mathematics.

Appointments, Graduate Affairs, Promotion and Tenure, and Workload Committees, Department of Mathematics.

Science of Information Theme Executive Committee, Faculty of Science.

External Awards Committee, Faculty of Science.

Co-organizer (with Paul Balmer, Ivo Dell’Ambrogio and Amnon Neeman) of the workshop “Triangulated categories and applications,” Banff International Research Station, June 19-24, 2016.

Co-organizer (with Chris Kapulkin and Rick Jardine) of the workshop “Homotopy type theory and univalent foundations,” May 16-20, 2016.

2014–2015:

Associate Chair, Graduate, Department of Mathematics.

Appointments, Graduate Affairs and Promotion and Tenure Committees, Department of Mathematics.

Science of Information Theme Executive Committee, Faculty of Science.

External Awards Committee, Faculty of Science.

2013–2014:

Appointments, Awards, Graduate Affairs and Unit Users Committees, Department of Mathematics.

2012–2013: on sabbatical

2011–2012:

Acting Chair for 1 month, Department of Mathematics.

Associate Chair, Graduate, Department of Mathematics.

Appointments, Awards, Graduate Affairs and Unit Users Committees, Department of Mathematics.

Assisted in search for Associate Dean Graduate, Faculty of Science.

2010–2011:

Acting Chair for 2 weeks, Department of Mathematics.

Associate Chair, Graduate, Department of Mathematics.

Appointments and Graduate Affairs Committees, Department of Mathematics.

Chair Selection Committee for the Department of Mathematics.

Nominating Committee, Faculty of Science.

Co-organizer (with Paul Balmer and Amnon Neeman) of the workshop “Triangulated categories and applications,” Banff International Research Station, June 12-17, 2011.

2009–2010:

Appointments, Graduate Affairs, Algebra Seminar and ad hoc Planning Committees in Department of Mathematics.

Chair Selection Committee for the Department of Mathematics.

Nominating Committee (Chair), Fields Institute Committee (until November 2009) and NSERC USRA ranking committee, Faculty of Science.

2008–2009:

Appointments, Graduate Affairs and Promotion and Tenure Committees in Department of Mathematics.

Nominating Committee (Chair), Fields Institute Committee and NSERC USRA ranking committee, Faculty of Science.

2007–2008:

Appointments, Graduate Affairs and Promotion and Tenure Committees in Department of Mathematics.

Interdisciplinary Curriculum Committee, Nominating Committee and Fields Institute Committee, Faculty of Science.

2006–2007:

Co-organizer (with Rick Jardine and Gunnar Carlsson) of the program “Geometric applications of homotopy theory,” Fields Institute, January to June, 2007.

Appointments Committee, Promotion and Tenure Committee and Unit Users Committee.

2005–2006 (on sabbatical):

Administration of departmental computing cluster.

2004–2005:

Co-organizer (with Lucho Avramov, Bill Dwyer and Brooke Shipley) of the workshop “Interactions between homotopy theory and algebra”, July 26 to August 6, 2004.

Appointments Committee and Unit Users Committee.

Departmental representative for collaborative graduate program in computational science.

Member of the Theoretical Physics Ph.D. program executive committee.

Expansion and administration of departmental Beowulf cluster.

2003–2004:

Co-organizer (with Rick Jardine) of a month-long Fields Institute Program on Applied Homotopy Theory at UWO, September 2003.

Appointments, Graduate Affairs and Awards Committees.

Faculty committees for NSERC USRA’s and for Ontario Graduate Scholarship in Science & Technology Competition.

Departmental representative for collaborative graduate program in computational science.

Member of the Theoretical Physics Ph.D. program executive committee.

Expansion and administration of departmental Beowulf cluster.

2002–2003:

Appointments, graduate affairs, awards and colloquium committees.

Departmental representative for collaborative graduate program in computational science.

Purchase, installation and administration of departmental Beowulf cluster.

2001–2002:

Graduate affairs, awards and colloquium committees. Faculty committee for NSERC USRA’s.

Co-organizer (with Rick Jardine) of the Ontario Topology Seminar, October 2001.

2000–2001:

Faculty committee for NSERC USRA’s.

Co-organizer (with Rick Jardine) of the Ontario Topology Seminar, October 2000.

### **Perimeter Institute**

2001–2002: Organizer of quantum gravity seminar.

### **Johns Hopkins University**

1997–1999: Organizer of topology seminar. Undergraduate advising. Graduate affairs committee. Graduate admissions. Computer committee. Purchase, installation and administration of departmental computer system.