

Mathematics & Statistics

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# Hans U. Boden

## Research Interests

Gauge theory; low-dimensional topology; invariants of knots, links, and 3-manifolds; character varieties; moduli spaces of holomorphic bundles

## Employment

- 2006 – **Professor**, *McMaster University*, Hamilton, Ontario Canada.
- 2009 – 2018 **Chair**, *Mathematics & Statistics, McMaster University*, Hamilton, Ontario Canada.  
Introduced the following undergraduate and graduate programs: *Honours Program in Actuarial and Financial Mathematics*, *Professional Masters in Financial Mathematics (M-Phimac)*, and a new *Ph.D. Program in Statistics*
- 2000 – 2006 **Associate Professor**, *McMaster University*, Hamilton, Ontario Canada.
- 2000 – 2001 **Associate Professor**, *Ohio State University*, Mansfield, Ohio USA.
- 1997 – 2000 **Assistant Professor**, *Ohio State University*, Mansfield, Ohio USA.
- 1995 – 1997 **Postdoctoral Fellow**, *McMaster University*, Hamilton, Ontario Canada.
- 1993 – 1995 **Research Mathematician**, *Max Planck Institute for Mathematics*, Bonn, Germany.
- 1990 – 1993 **Assistant Professor**, *University of Michigan*, Ann Arbor, Michigan USA.

## Visiting Positions

- 8/22–9/2022 **International Visitor**, *Mathematical Research Institute, University of Sydney*, Sydney, Australia  
(expected).
- 7/14–6/2015 **Visiting Mathematician**, *Fields Institute*, Toronto, Canada.
- 1/12–6/2012 **Visiting Researcher**, *Max Planck Institute for Mathematics*, Bonn, Germany.
- 7/2006 **Participant**, *Park City Mathematics Institute*, Park City, Utah USA.
- 4/05–6/2005 **Visiting Researcher**, *Max Planck Institute for Mathematics*, Bonn, Germany.
- 9/04–4/2005 **Visiting Mathematician**, *Fields Institute*, Toronto, Canada.
- 6/02–7/2002 **Visiting Researcher**, *Max Planck Institute for Mathematics*, Bonn, Germany.
- 5/01–7/2001 **Visitor**, *Institut des Hautes Études Scientifiques*, Bures-sur-Yvette, France.
- 9/98–12/1998 **Visiting Professor**, *Indiana University*, Bloomington, Indiana USA.
- 7/1994 **Participant**, *Park City Mathematics Institute*, Park City, Utah USA.
- 4/1994 **Visitor**, *Institut des Hautes Études Scientifiques*, Bures-sur-Yvette, France.

## Education

- 1991 **Ph.D. Mathematics**, *Brandeis University*.  
Thesis: *Representations of orbifold groups and parabolic bundles*  
Advisor: *Daniel Ruberman*
- 1984 **B.S. Mathematics**, *University of New Hampshire*.

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## Grants & Awards

- 2001 – **Discovery Grant**, *Gauge theory and low-dimensional topology*, Natural Sciences and Engineering Research Council of Canada, Ottawa, Canada.
- 2003 – 2005 **Infrastructure Grant**, *Computational algebra in logic and geometry*, Canada Foundation for Innovation/Ontario Innovation Trust, Ottawa, Canada.
- 1999 – 2001 **Research Grant**, *Moduli spaces,  $SU(n)$  gauge theory and 3-dimensional topology*, National Science Foundation, Washington DC, United States.

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## Books Edited

2. *Chern Simons Gauge Theory: 20 Years After*, Edited by J. E. Anderson, H. U. Boden, A. Hahn and B. Himpel, AMS/IP Studies in Advanced Mathematics **50**, American Mathematical Society & International Press, 2011
1. *Geometry and Topology of Manifolds*, Edited by H. U. Boden, I. Hambleton, A. J. Nicas and B. D. Park, Fields Institute Communications **47**, American Mathematical Society, 2005

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## Publications

40. *Virtual concordance and the generalized Alexander polynomial*, H. U. Boden and M. Chrisman, Journal of Knot Theory and Its Ramifications, **30** (2021) no. 5, ID: 2150030, 35 pp.
39. *Minimal crossing diagrams have minimal supporting genus*, H. U. Boden and **W. Rushworth**<sup>1</sup>, Bulletin of the London Mathematical Society, **53** (2021), no. 4, 1174–1184
38. *The Jones-Krushkal polynomial and minimal diagrams of surface links*, H. U. Boden and **H. Karimi**, 2019 preprint, to appear in Annales de l'Institut Fourier (Grenoble), ArXiv math.GT/1908.06453
37. *Generalized Fishburn numbers and torus knots*, **C. Bijaoui**, H. U. Boden, **B. Myers**, R. Osburn, **W. Rushworth**, **A. Tronsgard**, **S. Zhou**, Journal of Combinatorial Theory, Series A **178** (2021) 105355
36. *Signature and concordance of virtual knots*, H. U. Boden, M. Chrisman, and **R. Gaudreau**, Indiana University Mathematics Journal **69** (2020), no. 7, 2395–2459
35. *Virtual and welded periods of classical knots*, H. U. Boden and A. J. Nicas, Breadth in Topology, 29–42, Proceedings of Symposia in Pure Mathematics, **102**, American Mathematical Society, Providence, RI, 2019
34. *Virtual knot cobordism and bounding the slice genus*, H. U. Boden, M. Chrisman, and **R. Gaudreau**, Experimental Mathematics, **28** (2019), no. 4, 475–491
33. *Alexander invariants of periodic virtual knots*, H. U. Boden, A. J. Nicas, and **L. White**, Dissertationes Mathematicae **530** (2018) 1–59
32. *Concordance group of virtual knots*, H. U. Boden and **M. Nagel**, Proceedings of the American Mathematical Society **145** (2017), no. 12, 5451–5461
31. *Virtual knot groups and almost classical knots*, H. U. Boden, **R. Gaudreau**, **E. Harper**, A. J. Nicas, and **L. White**, Fundamenta Mathematicae **138** (2017), no. 2, 101–142
30. *The  $SU(2)$  Casson-Lin invariant of the Hopf link*, H. U. Boden and C. M. Herald, Pacific Journal of Mathematics **285** (2016), no. 2, 283–288
29. *The  $SU(N)$  Casson-Lin invariants for links*, H. U. Boden and **E. Harper**, Pacific Journal of Mathematics **285** (2016), no. 2, 257–282
28. *The  $SL(2, \mathbb{C})$  Casson invariant for knots and the  $\widehat{A}$ -polynomial*, H. U. Boden and C. L. Curtis, Canadian Journal of Mathematics **68** (2016), no. 1, 3–23
27. *Alexander invariants for virtual knots*, H. U. Boden, **E. Dies**, **A. I. Gaudreau**, **A. Gerlings**, **E. Harper**, and A. J. Nicas, Journal of Knot Theory and Its Ramifications, **24** (2015), no. 3, ID: 1550009, 62 pp.

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<sup>1</sup>Names of supervised student and postdoc coauthors are in boldface

26. *Bridge numbers for virtual and welded knots*, H. U. Boden and **A. I. Gaudreau**, *Journal of Knot Theory and Its Ramifications*, **24** (2015), no. 2, ID: 1550008, 15 pp.
25. *Metabelian  $SL(n, \mathbb{C})$  representations of knot groups IV: twisted Alexander polynomials*, H. U. Boden and S. Friedl, *Mathematical Proceedings of the Cambridge Philosophical Society* **156** (2014), no. 1, 81–97
24. *Metabelian  $SL(n, \mathbb{C})$  representations of knot groups III: deformations*, H. U. Boden and S. Friedl, *Quarterly Journal of Mathematics* **65** (2014), no. 3, 817–840
23. *Nontriviality of the  $M$ -degree of the  $A$ -polynomial*, H. U. Boden, *Proceedings of the American Mathematical Society* **142** (2014), no. 6, 2173–2177
22. *The  $SL(2, \mathbb{C})$  Casson invariant for Dehn surgeries on two-bridge knots*, H. U. Boden and C. Curtis, *Algebraic and Geometric Topology* **12** (2012), no. 4, 2095–2126
21. *Metabelian  $SL(n, \mathbb{C})$  representations of knot groups II: fixed points*, H. U. Boden and S. Friedl, *Pacific Journal of Mathematics* **249** (2011), no. 1, 1–10
20. *Splitting the spectral flow and the  $SU(3)$  Casson invariant for spliced sums*, H. U. Boden and B. Hempel, *Algebraic and Geometric Topology* **9** (2009), no. 2, 865–902
19. *Metabelian  $SL(n, \mathbb{C})$  representations of knot groups*, H. U. Boden and S. Friedl, *Pacific Journal of Mathematics* **238** (2008), no. 1, 7–25
18. *Splicing and the  $SL_2(\mathbb{C})$  Casson invariant*, H. U. Boden and C. L. Curtis, *Proceedings of the American Mathematical Society* **136** (2008), no. 7, 2615–2623
17. *The  $SL_2(\mathbb{C})$  Casson invariant for Seifert fibered homology spheres and surgeries on twist knots*, H. U. Boden and C. L. Curtis, *Journal of Knot Theory and Its Ramifications* **15** (2006), no. 7, 813–837
16. *The integer valued  $SU(3)$  Casson invariant for Brieskorn spheres*, H. U. Boden, C. M. Herald and P. A. Kirk, *Journal of Differential Geometry* **71** (2005), no. 1, 23–83
15. *The Calderón Projector for the Odd Signature Operator and Spectral Flow Calculations in 3-Dimensional Topology*, H. U. Boden, C. M. Herald and P. Kirk, *Contemporary Mathematics* **366** (2005) 125–150
14. *On the integer valued  $SU(3)$  Casson invariant*, H. U. Boden, C. Herald and P. Kirk, 2001 Georgia International Topology Conference, *AMS Proceedings of Symposia in Pure Mathematics* **71** (2003) 209–236
13. *The  $SU(3)$  Casson invariant for 3-Manifolds split along a 2-sphere or a 2-torus*, H. U. Boden and C. Herald, *Topology and Its Applications* **124** (2002), no. 2, 187–204
12. *An integer valued  $SU(3)$  Casson invariant*, H. U. Boden, C. Herald and P. Kirk, *Mathematical Research Letters* **8** (2001), no. 5-6, 589–603
11. *Gauge theoretic invariants of Dehn surgeries on knots*, H. U. Boden, C. Herald, P. Kirk, and E. Klassen, *Geometry and Topology* **5** (2001) 143–226
10. *Universal formulae for  $SU(n)$  Casson invariants of knots*, H. U. Boden and A. Nicas, *Transactions of the American Mathematical Society* **352** (2000), no. 7, 3149–3187
9. *A connected sum formula for the  $SU(3)$  Casson invariant*, H. U. Boden and C. Herald, *Journal of Differential Geometry* **53** (1999), no. 3, 443–464
8. *Rationality of moduli spaces of parabolic bundles*, H. U. Boden and K. Yokogawa, *Journal of the London Mathematical Society (2)* **59** (1999), no. 2, 461–478
7. *The  $SU(3)$  Casson invariant for integral homology 3-spheres*, H. U. Boden and C. Herald, *Journal of Differential Geometry* **50** (1998), no. 1, 147–206
6. *Invariants of fibred knots from moduli*, H. U. Boden, in *Geometric Topology*, Ed. W. Kazez, *AMS/IP Studies in Advanced Mathematics*, vol. 2, (1997) 259–267
5. *Integrality of the averaged Jones polynomial of algebraically split links*, H. U. Boden, *Journal of Knot Theory and Its Ramifications* **6** (1997), no. 3, 303–307
4. *Moduli spaces of parabolic Higgs bundles and parabolic  $K(D)$  pairs over smooth curves*, H. U. Boden and K. Yokogawa, *International Journal of Mathematics* **7** (1996), no. 5, 573–598

3. *Variations of moduli of parabolic bundles*, H. U. Boden and Y. Hu, *Mathematische Annalen* **301** (1995), no. 3, 539–559
2. *Unitary representations of Brieskorn spheres*, H. U. Boden, *Duke Mathematical Journal* **75** (1994), no. 1, 193–220
1. *Representations of orbifold groups and parabolic bundles*, H. U. Boden, *Commentarii Mathematici Helvetici* **66** (1991), no. 3, 389–447

## Preprints

5. *Braid representatives minimizing the number of simple walks*, H. U. Boden and **M. Shimoda**, 2021 preprint, under submission, ArXiv math.GT/2109.11483
4. *The Gordon-Litherland pairing for links in thickened surfaces*, H. U. Boden, M. Chrisman, and **H. Karimi**, 2021 preprint, under submission, ArXiv math.GT/2107.00426
3. *A characterization of alternating links in thickened surfaces*, H. U. Boden and **H. Karimi**, 2020 preprint, under submission, ArXiv math.GT/2010.14030
2. *Adequate links in thickened surfaces and the generalized Tait conjectures*, H. U. Boden, **H. Karimi** and A. Sikora, 2020 preprint, under submission, ArXiv math.GT/2008.09895
1. *Rationality of the moduli space of vector bundles over a smooth curve*, H. U. Boden, 1995 IHES preprint

## Supervision

### Doctoral Students

- 2018 **Homayun Karimi**, Ph.D. thesis: *Alternating Virtual Knots*  
 2016 **Lindsay White**, Ph.D. thesis: *Alexander Invariants of Periodic Virtual Knots*  
 2011 **George Dragomir**, Ph.D. thesis: *Closed Geodesics on Compact Developable Orbifolds*

### Masters Students

- 2021 **Lindsay White**, M.Sc. thesis: *A Privacy Score for Anonymous Databases*  
 2019 **Jie Chen**, M.Sc. thesis: *Unknotting Operations for Classical, Virtual and Welded Knots*  
 2016 **Robin Gaudreau**, M.Sc. thesis: *Parities of Virtual Braids and String Links*  
 2014 **Chris Gatopoulos**, M.Sc. thesis: *Braid Group Cryptography*  
 2013 **Homayun Karimi**, M.Sc. thesis: *The Ribbon-Slice Conjecture*  
 2012 **Chris Henry**, M.Sc. thesis: *The (Nested) Word Problem*  
 2011 **Michael Parchimowicz**, M.Sc. thesis: *An Examination of Four Knot Classes*  
 2010 **Lokman Tsui**, M.Sc. thesis: *Chern-Simons Gauge Theory and the Jones Polynomial*  
 2006 **David Lorne**, M.Sc. project: *Jones Polynomial, Knot Cohomology and Torus Knots*  
 2005 **George Dragomir**, M.Sc. thesis: *Orbifolds of Nonpositive Curvature and Their Loop Space*  
 2003 **Richard Smeltzer**, M.Sc. thesis: *Linear Representations of Braid Groups*

### Undergraduate Students

- 2021 **Matthew Shimoda**, Stewart award: *Simple Walks and the Colored Jones Polynomial*  
 2020 **Matthew Shimoda**, USRA project: *Knots and Quantum Topology*  
 2020 **Matthew How-Chun-Lun**, Stewart award: *Algebraic and Geometric Topology*  
 2020 **Johanna Schwartztruber**, Honours thesis: *To Four Colours and Beyond*  
 2020 **Ke Liang Xiao**, Honours thesis: *Morse Theory and Applications*  
 2019 **Colin Bijaoui**, FUSRP (Fields): *Quantum Invariants of Knots and Modularity*  
 2019 **Beckham Myers**, FUSRP (Fields): *Quantum Invariants of Knots and Modularity*  
 2019 **Aaron Trongsard**, FUSRP (Fields): *Quantum Invariants of Knots and Modularity*  
 2019 **Shaoyang Zhou**, FUSRP (Fields): *Quantum Invariants of Knots and Modularity*  
 2018 **Jiakai Li**, Research project: *Yang Mills Equations on Riemann Surfaces*

- 2018 **Colin Bijaoui**, USRA project: *Invariants of Virtual Knot Concordance*
- 2018 **Marco Handa**, USRA project: *Invariants of Virtual Knot Concordance*
- 2017 **Matthew Jordan**, Research project: *Mathematics of cognition*
- 2016 **Guillian Ballisi**, USRA project: *Geometry of Infinite Groups*
- 2014 **Anne Isabel Gaudreau**, Research project: *Invariants of Almost Classical Knots*
- 2014 **Emily Dies**, USRA project: *Invariants of Welded Knots*
- 2014 **Ervin Thiagalingam**, USRA project: *Algebraic Curves and Knot Theory*
- 2014 **Jamal Kawach**, Honours thesis: *Khovanov Homology, Slice Invariants, and Exotic  $\mathbb{R}^4$*
- 2013 **Emily Dies**, USRA project: *The Virtual and Welded Braid Groups*
- 2013 **Anne Isabel Gaudreau**, USRA project: *Alexander Invariants of Virtual Knots*
- 2013 **Adam Gerlings**, USRA project: *Alexander Invariants of Virtual Knots*
- 2011 **Christopher Lam**, USRA project: *The Volume Conjecture*
- 2010 **Vanessa Foster**, USRA project: *Knots, Links, and Braids*
- 2009 **Chris Henry**, USRA project: *Research in Geometric Group Theory*
- 2008 **Chris Henry**, USRA project: *Groups via Topology, Combinatorics, and Geometry*
- 2007 **Sylvia Andreae**, ArtSci thesis: *Explorations in Braid Theory*
- 2007 **Chris Henry**, USRA project: *Automatic Structures and Combinatorial Group Theory*
- 2006 **Steffen Marcus**, ArtSci thesis: *Mathematical Logic and Point-Set Topology*
- 2006 **Steffen Marcus**, USRA project: *Algebraic Curves and Algebraic Geometry*

### Doctoral Examining Committees

- 2018 **Michael Clemens**, *Framing Nature and Nation: The Environmental Cinema of the National Film Board, 1939–1974*, McMaster University
- 2016 **Lauren DeDieu**, *Newton-Okounkov Bodies of Bott-Samelson and Peterson Varieties*, McMaster University
- 2015 **Oleg Chterental**, *Virtual Braids and Virtual Curve Diagrams*, University of Toronto
- 2013 **Nima Anvari**, *Equivariant Gauge Theory and Four Manifolds*, McMaster University
- 2012 **Reza Taleb**, *Equivariant Iwasawa theory and the Coates-Sinnot Conjecture*, McMaster University
- 2009 **Liam Watson**, *Involutions on 3-manifolds and Khovanov homology*, Université du Québec à Montréal
- 2007 **Jian Xu**, *Mei – A Module System for Mechanized Mathematics*, McMaster University

### Postdoctoral Fellows

<b>Homayun Karimi</b>	<b>George Dragomir</b>	<b>Alyson Hildum</b>
<b>William Rushworth</b>	<b>Matthias Nagel</b>	<b>Özgün Ünlü</b>
<b>Eric Harper</b>	<b>David Duncan</b>	<b>Eduardo Martinez Pedroza</b>
<b>Ben Mares</b>	<b>Prayat Poudel</b>	<b>Hee Jung Kim</b>
<b>Tolga Etgü</b>	<b>Jonathan Yazinski</b>	<b>Martin Niepel</b>
<b>Brendan Owens</b>	<b>Tom Klein</b>	<b>Jaime Cuadros</b>
<b>Sašo Strle</b>	<b>Ke Zhu</b>	<b>Vincent Bonini</b>
		<b>Brad Safnuk</b>

### Doctoral Supervisory Committee

<b>Nima Anvari</b>	<b>Lauren DeDieu</b>	<b>Mehmetcik Pamuk</b>
<b>Semra Pamuk</b>	<b>Lucian Savin</b>	

## Masters Examining Committee

Nima Anvari  
Piotr Jagiello  
Qiuping Lu

Darren Gray  
Carolyn Junkins  
Wangshan Lu

Praphat Fernandes  
Qun Li  
Ami Mamolo

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## Conference Organization (since 2016)

- 3/2022 *Interactions of Gauge Theory with Contact and Symplectic Topology*, Banff International Research Station, Banff, Alberta (expected)
- 11/2020 *Workshop on link homology and concordance*, Fields Institute, Toronto, Ontario
- 6/2020 *Interactions of Gauge Theory with Contact and Symplectic Topology*, Banff International Research Station, Banff, Alberta
- 12/2019 *Topology*, 2019 Winter Meeting of the CMS, Toronto, Ontario
- 9/2017 *Infinite Groups and Geometric Structures*, 1132nd Meeting of the AMS, University of Buffalo, Buffalo, NY USA
- 12/2016 Scientific Director, *2016 Winter Meeting of the Canadian Mathematical Society*, Niagara Falls, Ontario
- 5/2016 *Flavours of Gauge Theory: Rubermania!*, Fields Institute, Toronto, Ontario
- 3/2016 *Interactions of Gauge Theory with Contact and Symplectic Topology*, Banff International Research Station, Banff, Alberta

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## Invited Conference Talks (since 2016)

- 7/2021 *Knots, surfaces, and 3-manifolds*, Mathematical Congress of the Americas, Buenos Aires, Argentina
- 6/2021 *Low-dimensional topology*, 2021 Summer Meeting of the CMS, Ottawa, Ontario
- 11/2019 *Unifying 4-dimensional knot theory*, Banff International Research Station, Banff, Alberta
- 3/2019 *International conference on Graph Theory and Combinatorics*, Beijing Jiaotong University, Beijing, China
- 12/2018 *Topology*, 2018 Winter Meeting of the CMS, Vancouver, British Columbia
- 3/2018 *Algebraic, Combinatorial, and Quantum Invariants of Knots and Manifolds*, 1136th Meeting of the AMS, Ohio State University, Columbus, OH USA
- 2/2018 *CNRS–McMaster Joint Workshop*, McMaster Innovation Park, Hamilton, Ontario
- 12/2017 *Low dimensional topology and geometric group theory*, 2017 Winter Meeting of the CMS, Waterloo, Ontario
- 9/2017 *Knots, 3-manifolds and their invariants*, 1132nd Meeting of the AMS, University of Buffalo, Buffalo, NY USA
- 8/2017 *Low-dimensional topology and gauge theory*, Casa Matemática Oaxaca (CMO), Oaxaca, Mexico
- 7/2017 *Interactions between geometric group theory, topology and geometry, and dynamics*, Mathematical Congress of the Americas 2017, Montréal, Quebec
- 12/2016 *Geometry and Topology in Low Dimensions: Interactions with Floer theory*, 2016 Winter Meeting of the CMS, Niagara Fall, Ontario

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## Invited Seminars and Colloquia (since 2016)

- 3/2021 *Topology Seminar*, University of Nevada, Reno, Nevada (Zoom)
- 2/2021 *Colloquium*, Beijing Normal University, Beijing, China (Zoom)
- 2/2021 *Topology Seminar*, Brandeis University, Waltham, Massachusetts (Zoom)
- 12/2020 *Geometry and Topology Seminar*, City University of New York, New York, New York (Zoom)
- 11/2020 *CKVK\* Seminar*, Ohio State University, Columbus, Ohio (YouTube)

- 9/2020 *Knots and Representation Theory*, Moscow State Technical University, Moscow, Russia (Skype)  
 5/2020 *Knots and Representation Theory*, Moscow State Technical University, Moscow, Russia (Skype)  
 2/2020 *Topology Seminar*, University at Buffalo, Buffalo, NY, USA  
 4/2019 *Geometry and Physics Seminar*, University of Miami, Miami, Florida, USA  
 10/2018 *Knot Theory Seminar*, Moscow State Technical University, Moscow, Russia (Skype)  
 2/2016 *Topology Seminar*, University at Buffalo, Buffalo, NY, USA

## Teaching Experience

- 2000 – **Instructor**, *Mathematics & Statistics, McMaster University*, Hamilton, Ontario Canada.
- |                               |                               |                               |
|-------------------------------|-------------------------------|-------------------------------|
| <b>Math 1AA3</b> (2 sections) | <b>Math 1K03</b>              | <b>Math 1M03</b>              |
| <b>Math 1N03</b>              | <b>Math 1X03</b>              | <b>Math 1ZB3</b>              |
| <b>Math 2R03</b> (4 sections) | <b>Math 2S03</b> (2 sections) | <b>Math 2X03</b>              |
| <b>Math 3EE3</b> (2 sections) | <b>Math 3T03</b> (4 sections) | <b>Math 4B03</b> (3 sections) |
| <b>Math 4BB3</b> (2 sections) | <b>Math 4E03</b>              | <b>Math 4SF3</b>              |
| <b>Math 4T03</b> (2 sections) | <b>Math 4TT3</b> (2 sections) | <b>Math 731</b> (2 sections)  |
| <b>Math 762</b>               | <b>Math 795</b>               | <b>Math 761</b> (2 sections)  |
| <b>ArtSci 1D06</b>            |                               |                               |

## University Service

- 2018– **Member**, *Advisory Committee, McMaster Museum of Art, McMaster University*, Hamilton, Ontario.
- 2018– **Member**, *Senate, McMaster University*, Hamilton, Ontario.
- 2009–2018 **Department Chair**, *Mathematics & Statistics, McMaster University*, Hamilton, Ontario.
- 2009–2018 **Member**, *Faculty Council, Faculty of Science, McMaster University*, Hamilton, Ontario.
- 2005–2007 **Associate Chair (Graduate)**, *Mathematics & Statistics, McMaster University*, Hamilton, Ontario.  
 & 2002–2004
- 2009–2018 **Chair**, *Tenure and Promotion Committee*, Mathematics & Statistics, McMaster University, Hamilton, Ontario.
- 2009–2018 **Chair**, *Appointments Committee*, Mathematics & Statistics, McMaster University, Hamilton, Ontario.
- 2005–2007 **Chair, Graduate Admissions and Curriculum Committee**, *Mathematics & Statistics, McMaster University*, Hamilton, Ontario.  
 & 2002–2004
- 2003–2004 **Member**, *Tenure and Promotion Committee*, Mathematics & Statistics, McMaster University, Hamilton, Ontario.  
 & 2006–2007
- 2002–2003 **Member**, *Appointments Committee*, Mathematics & Statistics, McMaster University, Hamilton, Ontario.  
 & 2004–2005
- 2002–2003 **Member**, *Graduate Science Curriculum Committee*, School of Graduate Studies, McMaster University, Hamilton, Ontario.  
 & 2004–2005
- 2002–2007 **Member**, *McMaster-Fields Supporting University Action Committee*.

## Activities & External Service

- 2019– **Member**, *Board of Directors, Canadian Mathematical Society*.
- 2016– **Associate Editor**, *Canadian Journal of Mathematics*.
- 2016– **Associate Editor**, *Canadian Mathematical Bulletin*.
- 2018 **Member**, *IQAP Site Visit Team*, Department of Mathematical Sciences, Lakehead University.
- 2009–2018 **Member**, *Committee of Academic Sponsors*, Mathematical Research Sciences Institute (MSRI), Berkeley, CA USA.

- 2009 **Member**, *MSRI Site Visit Team*, Division of Mathematical Sciences, National Science Foundation.
- 2009–2018 **Member**, *Corporation of the Fields Institute*, Toronto, Ontario.
- 2006–2009 **Member**, *Grant Selection Committee 336*, Pure and Applied Math A, Natural Sciences and Engineering Research Council.
- 2007–2009 **Chair**, *Grant Selection Committee 336*, Pure and Applied Math A, Natural Sciences and Engineering Research Council.
- 2007–2014 **Member**, *Mathematics NSERC Liaison Committee*.
- 2015– **Referee**, *Proposed Workshops*, Banff International Research Station.
- 1998– **Referee**, *Grants in Mathematics*, National Science Foundation.
- 2001– **Referee**, *Grants in Pure Mathematics*, Natural Sciences and Engineering Research Council of Canada.
- 1997– **Reviewer**, *Mathematical Reviews*.  
Reviewed 124 journal articles and 1 book
- 2008– **Reviewer**, *Zentralblatt*.  
Reviewed 14 journal articles and 1 book
- 1994– **Referee**, *Math Journals*.
- *Advances in Mathematics*
  - *Algebraic and Geometric Topology*
  - *American Journal of Mathematics*
  - *Bulletin of the London Mathematical Society*
  - *Canadian Journal of Mathematics*
  - *Canadian Math Bulletin*
  - *Communications in Contemporary Mathematics*
  - *Compositio Mathematica*
  - *European Journal of Combinatorics*
  - *Experimental Mathematics*
  - *Geometry and Topology*
  - *Geometriae Dedicata*
  - *Indiana University Mathematics Journal*
  - *Journal of Differential Geometry*
  - *Journal of the European Mathematical Society*
  - *Journal of the Mathematical Society of Japan*
  - *Journal of Knot Theory and Its Ramifications*
  - *Journal of Mathematical Sciences*
  - *Journal of Pure and Applied Algebra*
  - *Journal of Topology*
  - *Mathematische Annalen*
  - *Mathematische Zeitschrift*
  - *Memoirs of the American Mathematical Society*
  - *Michigan Mathematical Journal*
  - *Pacific Journal of Mathematics*
  - *Proceedings of the American Mathematical Society*
  - *Proceedings of the London Mathematical Society*
  - *Publicacions Matemàtiques*
  - *Quantum Topology*
  - *Quarterly Journal of Mathematics*



- *Rocky Mountain Journal of Mathematics*
- *Tbilisi Mathematical Journal*
- *Topology*
- *Topology and Its Applications*
- *Transactions of the American Mathematical Society*
- *Transformation Groups*