Ricardo Fukasawa

Curriculum Vitae

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www.math.uwaterloo.ca/~rfukasaw

Areas of Interest

- Mixed Integer Programming (theory and computation)
- Operations Research
- Polyhedral Combinatorics
- Discrete/Combinatorial Optimization
- Routing problems
- Stochastic optimization

Education

08/2003-08/2008 **Ph.D in Algorithms, Combinatorics and Optimization (ACO)**, *GeorgiaTech*
GPA: 4.0/4.0

07/2000-07/2002 **M.Sc. in Electrical Engineering**, *PUC-Rio*
Emphasis on Decision Support Methods. GPA: 9.9/10.0

03/1995-07/2000 **Bachelor of Science in Electrical Engineering**, *PUC-Rio*
Emphasis on Decision Support Methods GPA: 8.9/10.0

Work Experience

07/2020–present **Professor**, *University of Waterloo*, Waterloo, Canada

07/2013–06/2020 **Associate Professor**, *University of Waterloo*, Waterloo, Canada

08/2009–06/2013 **Assistant Professor**, *University of Waterloo*, Waterloo, Canada

08/2008-07/2009 **Herman Goldstine Postdoctoral fellow**, *IBM Research*, Yorktown Heights, NY

08/2003-07/2008 **Graduate Research Assistant**, *Georgia Institute of Technology*, Atlanta, GA

05/2006-07/2006 **Summer intern**, *IBM Research*, Yorktown Heights, NY

05/2004-08/2004 **Summer manager**, *AT&T Research Labs*, Florham Park, NJ

07/2000-06/2003 **Optimization manager**, *GAPSO Inc*, Rio de Janeiro, Brazil

Teaching Experience

- **Portfolio Optimization**. University of Waterloo
  Undergraduate course. Terms: Fall 2022.
- **Optimization under uncertainty**. University of Waterloo
  Grad course. Terms: Fall 2019.
- **Fundamentals of Optimization**. University of Waterloo
  Grad course. Terms: Fall 2018.
- **Combinatorial Optimization**. University of Waterloo
  Undergrad/Grad course. Terms: Fall 2011, Fall 2015, Fall 2020, Fall 2021.
- **Integer Programming**. University of Waterloo
  Undegrad/Grad course. Terms: Winter 2011, Winter 2017, Winter 2019, Winter 2021.
- **Computational Discrete Optimization**. University of Waterloo
  Undergraduate course. Terms: Winter 2012, Winter 2014, Winter 2020.
- **Advanced Integer Programming**. University of Waterloo
  Graduate course. Term: Fall 2010, Winter 2016.
- **Introduction to Optimization (non-specialist level)**. University of Waterloo
  Undergraduate course. Terms: Fall 2010.
- **Introduction to Optimization**. University of Waterloo
  Undergraduate course. Terms: Fall 2010, Spring 2013, Fall 2016.
- **Introduction to Optimization (Advanced Level)**. University of Waterloo
  Undergraduate course. Terms: Winter 2018, Winter 2020, Fall 2022, Fall 2024.
- **Scheduling Theory**. University of Waterloo
  Undergraduate course. Terms: Spring 2015.
- **Deterministic OR Models**. University of Waterloo
  Undergraduate course. Terms: Fall 2009, Winter 2010, Winter 2012, Fall 2013, Winter 2014, Fall 2015, Fall 2017, Fall 2024.
- **Deterministic OR Models (non-specialist level)**. University of Waterloo
  Undergraduate course. Terms: Spring 2013, Spring 2015.
- **Engineering Optimization**. GeorgiaTech
  Undergraduate course. Fall 2007.

Publications

Refereed articles in Journals

[1] Matheus Ota(*) and Ricardo Fukasawa. Hardness of pricing routes for two-stage stochastic vehicle routing problems with scenarios. *Accepted to Operations Research*, 2024.

[2] Kavitha G. Menon(*), Ricardo Fukasawa, and Luis A. Ricardez-Sandoval. Integration of planning and scheduling for large-scale multijob multitasking batch plants. *Ind.*

Eng. Chem. Res., 63:1039–1054, 2024.

[3] Ricardo Fukasawa, Joe Naoum-Sawaya, and Daniel Oliveira(*). The price-elastic knapsack problem. *Omega*, 124:103003, 2024.

[4] Ricardo Fukasawa and Joshua Gunter(*). The complexity of branch-and-price algorithms for the capacitated vehicle routing problem with stochastic demands. *Operations Research Letters*, 51(1):11–16, 2023.

[5] Mauro Henrique Mulati(*), Ricardo Fukasawa, and Flávio Keidi Miyazawa. The arc-item-load and related formulations for the cumulative vehicle routing problem. *Discrete Optimization*, 45:100710, 2022.

[6] K. G. Menon(*), R. Fukasawa, and L. Ricardez-Sandoval. A novel stochastic programming approach for scheduling of batch processes with decision dependent time of uncertainty realization. *Annals of Operations Research*, 305:163–190, 2021.

[7] A. Xavier(*), R. Fukasawa, and L. Poirrier(**). Multi-row intersection cuts based on the infinity norm. *Published in INFORMS Journal on Computing*, 2021.

[8] Z. Stevenson(*), R. Fukasawa, and L. R. Sandoval. Evaluating periodic rescheduling policies using a rolling horizon framework in an industrial-scale multipurpose plant. *Journal of Scheduling*, 23(3):397–410, 2020.

[9] Z. Stevenson(*), R. Fukasawa, and L. R. Sandoval. A dynamic approach to selecting timepoints in short-term scheduling with application to multipurpose facilities. *Industrial & Engineering Chemistry Research*, 59(19):9180–9197, 2020.

[10] F. A. Santos(**), R. Fukasawa, and L. R. Sandoval. An integrated machine scheduling and personnel allocation problem for large-scale industrial facilities using a rolling horizon framework. *Optimization and Engineering*, 2020.

[11] R. Fukasawa, L. Poirrier(**), and S. Yang(*). Split cuts from sparse disjunctions. *Mathematical Programming Computation*, 12:295–335, 2020.

[12] D. Y. Lee(*), R. Fukasawa, and L. R. Sandoval. Bi-objective short-term scheduling in a rolling horizon framework: a priori approaches with alternative operational objectives. *Computers and Operations Research*, 111:141–154, 2019.

[13] N. Lappas, L. R. Sandoval, R. Fukasawa, and C. Gounaris. Adjustable robust optimization for multi-tasking scheduling with reprocessing due to imperfect tasks. *Optimization and Engineering*, 20(4):1117–1159, 2019.

[14] R. Fukasawa, L. Poirrier(**), and A. Xavier(*). The (not so) trivial lifting problem in two dimensions. *Mathematical Programming Computation*, 11(2):211–235, 2019.

[15] R. Fukasawa and L. Poirrier(**). Permutations in the factorization of simplex bases. *INFORMS Journal on Computing*, 31(3):612–632, 2019.

[16] T. Dinh(*), R. Fukasawa, and J. Luedtke. Exact algorithms for the chance-constrained vehicle routing problem. *Mathematical Programming Series B*, 172(1–2):105–138, 2018.

[17] A. Abdi(*), R. Fukasawa, and L. Sanitá. Opposite elements in clutters. *Mathematics of Operations Research*, 43(2):428–459, 2018.

[18] R. Fukasawa, L. Poirrier(**), and A. Xavier(*). Intersection cuts for single row corner relaxations. *Mathematical Programming Computation*, 10:423–455, 2018.

[19] R. Fukasawa, Q. He, F. Santos(**), and Y. Song. A joint vehicle routing and speed optimization problem. *INFORMS Journal on Computing*, 30(4):694–709, 2018.

[20] S. Lagzi(*), D. Y. Lee(*), R. Fukasawa, and L. Ricardez-Sandoval. A computational study of continuous and discrete time formulations for a class of short-term scheduling problems for multipurpose plants. *Industrial & Engineering Chemistry Research*, 56(31):8940–8953, 2017.

[21] S. Lagzi(*), R. Fukasawa, and L. Ricardez-Sandoval. A multitasking continuous time formulation for short-term scheduling of operations in multipurpose plants. *Computers and Chemical Engineering*, 97:135–146, 2017.

[22] R. Fukasawa and L. Poirrier(**). Numerically safe lower bounds for the capacitated vehicle routing problem. *INFORMS Journal on Computing*, 29(3):544–557, 2017.

[23] A. Abdi(*) and R. Fukasawa. On the mixing set with a knapsack constraint. *Mathematical Programming Series A*, 157(1):191–217, 2016.

[24] R. Fukasawa, Q. He, and Y. Song. A disjunctive convex programming approach to the pollution-routing problem. *Transportation Research Part B: Methodological*, 94:61–79, 2016.

[25] B. P. Patil(*), R. Fukasawa, and L. A. Ricardez-Sandoval. Scheduling of operations in a large-scale scientific services facility via multi-commodity flow and optimization-based algorithm. *Industrial & Engineering Chemistry Research*, 54(5):1628–1639, 2015.

[26] K.V. Isaac, J. Könemann, R. Fukasawa, D. Qian(*), A. Linhares(*), N. Saber, P. D. Nguyen, J. Drake, and J. Phillips. Optimization of cranio-orbital remodeling: Application of a mathematical model. *Journal of Craniofacial Surgery*, 26(5):e416–e419, 2015.

[27] R. Fukasawa, Q. He, and Y. Song. A branch-cut-and-price algorithm for the energy minimization vehicle routing problem. *Transportation Science*, 50(1):23–34, 2015.

[28] H. Abeledo, R. Fukasawa, A. Pessoa, and E. Uchoa. The time dependent traveling salesman problem: Polyhedra and branch-cut-and-price algorithm. *Mathematical Programming Computation*, 5(1):27–55, 2013.

[29] E. Uchoa, T. A. M. Toffolo, M. C. de Souza, A. X. Martins, and R. Fukasawa. Branch-and-cut and hybrid local search for the multi-level capacitated minimum spanning tree problem. *Networks*, 59(1):148–160, 2012.

[30] S. Dash, R. Fukasawa, and O. Günlük. The master equality polyhedron with multiple rows. *Mathematical Programming Series A*, 132(1–2):125–151, 2012.

[31] R. Fukasawa and O. Günlük. Strengthening lattice-free cuts using nonnegativity. *Discrete Optimization*, 8(2):229–245, 2011.

[32] R. Fukasawa and M. Goycoolea. On the exact separation of mixed integer knapsack cuts. *Mathematical Programming Series A*, 128:19–41, 2011.

[33] D. Espinoza, R. Fukasawa, and M. Goycoolea. Lifting, tilting and fractional programming revisited. *Operations Research Letters*, 38:559–563, November 2010.

[34] S. Dash, R. Fukasawa, and O. Günlük. On a generalization of the master cyclic group polyhedron. *Mathematical Programming Series A*, 125(1):1–30, 2010.

[35] W. Cook, S. Dash, R. Fukasawa, and M. Goycoolea. Numerically safe gomory mixed-integer cuts. *INFORMS Journal on Computing*, 21(4):641–649, 2009.

[36] E. Uchoa, R. Fukasawa, J. Lysgaard, A. Pessoa, M. Poggi de Aragão, and D. Andrade. Robust branch-cut-and-price for the capacitated minimum spanning tree problem over a large extended formulation. *Mathematical Programming Series A*, 112(2):443–472, 2008.

[37] R. Fukasawa, H. Longo, J. Lysgaard, M. Poggi de Aragão, M. Reis, E. Uchoa, and R. F. Werneck. Robust branch-and-cut-and-price for the capacitated vehicle routing problem. *Mathematical Programming Series A*, 106(3):491–511, 2006.

Submitted

[38] Weninger, Noah(*) and Ricardo Fukasawa. A fast combinatorial algorithm for the bilevel knapsack problem with interdiction constraints. *Submitted*, 2024.

[39] Lubke, Daniela(**), Ricardo Fukasawa, and Luis Ricardez-Sandoval. Integration of machine scheduling and personnel allocation for an industrial-scale analytical services facility using column generation. *Submitted*, 2024.

[40] Kavitha G. Menon(*), Ricardo Fukasawa, and Luis A. Ricardez-Sandoval. A multistage stochastic programming approach for short-term scheduling of batch processes under type ii endogenous uncertainty. *Submitted*, 2023.

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Refereed conference proceedings

[41] Claudio Contardo, Ricardo Fukasawa, Louis-Martin Rousseau, and Thibaut Vidal. Optimal counterfactual explanations for k-nearest neighbors using mathematical optimization and constraint programming. In *ISCO 2024 conference proceddings*, 2024.

[42] Weninger, Noah(*) and Ricardo Fukasawa. A fast combinatorial algorithm for the bilevel knapsack problem with interdiction constraints. In Alberto Del Pia and Volker Kaibel, editors, *Integer Programming and Combinatorial Optimization*, pages 438–452, Cham, 2023. Springer International Publishing.

[43] Lubke, Daniela(**), Ricardo Fukasawa, and Luis Ricardez-Sandoval. Integration of machine scheduling and personnel allocation for an industrial-scale analytical services facility. In *2023 9th International Conference on Control, Decision and Information Technologies (CoDIT)*, pages 1647–1652, 2023.

[44] T. Dinh(*), R. Fukasawa, and J. Luedtke. Exact algorithms for the chance-constrained vehicle routing problem. In *Proceedings of the 18th Integer Programming and Combinatorial Optimization conference IPCO'16, Liège, Belgium. Lecture Notes in Computer Science*, volume 9682, pages 89–101, 2016.

[45] N. Saber, A. Linhares(*), D. Qian(*), R. Fukasawa, J. Könemann, J. Drake, and J. Phillips. Towards mathematical optimization of pediatric cranial vault remodeling. *International Journal of Computer Assisted Radiology and Surgery*, 9((Suppl 1)):191–192, 2014.

[46] H. Abeledo, R. Fukasawa, A. Pessoa, and E. Uchoa. The time dependent traveling salesman problem: Polyhedra and branch-cut-and-price algorithm. In *Proceedings of the SEA 2010, Naples, Italy. Lecture Notes in Computer Science*, volume 6049, pages 202–213, 2010.

[47] R. Fukasawa and M. Goycoolea. On the exact separation of mixed-integer knapsack cuts. In *Proceedings of the twelfth Integer Programming and Combinatorial Optimization conference IPCO'07, Ithaca, NY. Lecture Notes in Computer Science*, volume 4513, pages 225–239, 2007.

[48] S. Dash, R. Fukasawa, and O. Günlük. On a generalization of the master cyclic group polyhedron. In *Proceedings of the twelfth Integer Programming and Combinatorial Optimization conference IPCO'07, Ithaca, NY. Lecture Notes in Computer Science*, volume 4513, pages 197–209, 2007.

[49] R. Fukasawa, J. Lysgaard, M. Poggi de Aragão, M. Reis, E. Uchoa, and R.F. Werneck. Robust branch-and-cut-and-price for the capacitated vehicle routing problem. In *Proceedings of the tenth Integer Programming and Combinatorial Optimization conference IPCO'04, New York, Lecture Notes in Computer Science*, volume 3064, pages 1–15, 2004.

[50] R. Fukasawa, M. Poggi de Aragão, O. Porto, and E. Uchoa. Robust branch-and-cut-and-price for the capacitated minimum spanning tree problem. In *Proceedings of the International Network Optmization Conference, Evry, France*, pages 231–236, 2003.

[51] R. Fukasawa, M. Poggi de Aragão, O. Porto, and E. Uchoa. Solving the freight car flow problem to optimality. In *Proceedings of the ATMOS 2002, Málaga, Spain. Electronic Notes in Theoretical Computer Science*, volume 66, pages 1–14. Elsevier, 2002.

Book chapters

[52] R. Fukasawa. Gomory cuts. In *Wiley Encyclopedia of Operations Research and Management Sciences*, 2013.

Thesis

[53] R. Fukasawa. *Single-row mixed-integer programs: Theory and computations*. PhD thesis, Algorithms, Combinatorics and Optimization program, GeorgiaTech, 2008.

[54] R. Fukasawa. Solution of railroad logistics problems using integer programming (in portuguese). Master's thesis, Electrical Engineering Department, PUC-Rio, 2002.

Presentations

Invited presentations

- **Fast exact algorithms for some interdiction problems**
  Invited presentation at University of Montreal (April 2024)
- **Fast exact algorithms for some interdiction problems**
  Invited presentation at Amazon Research (virtual) (February 2024)
- **Research in Applications**
  Invited presentation at URA seminar - University of Waterloo (June 2023)
- **The vehicle routing problem with stochastic demands**
  Invited presentation at University of Bordeaux (virtual) (September 2022)
- **A fast combinatorial algorithm for the bilevel knapsack problem with interdiction constraints**
  Invited presentation at Bonn Workshop on Combinatorial Optimization (October 2022)
- **IP formulations for vehicle routing with stochastic demands**
  Invited presentation at JPOC (virtual) (June 2021)
- **The Vehicle Routing Problem with uncertain demands**
  Invited presentation at URA seminar - University of Waterloo (June 2020)
- **Enforcing non-anticipativity in a two-stage stochastic program for scheduling with endogenous uncertainties**
  Invited presentation at Discrete Optimization Talks (Virtual) (June 2020)
- **Hardness of some set-partitioning formulations for the vehicle routing problem with stochastic demands**
  Invited presentation at (Virtual) Tutte colloquium - University of Waterloo (May 2020)
- **Optimization and Operations Research**
  Invited presentation at TORCH 2020 (March 2020)
- **Optimizing Cranial Vault Remodeling**
  Invited presentation at Ohio State University (February 2020)
- **Solving the Vehicle Routing Problem**
  Invited presentation at Computational Mathematics Colloquium - University of Waterloo (January 2020)
- **The lifting problem for cutting planes in Integer Programming (in portuguese)**
  Invited presentation at UNICAMP (September 2019)
- **The chance-constrained vehicle routing problem**
  Invited presentation at Wopoca 2019 (September 2019)

- **Vehicle routing under uncertainty**
  Semi-plenary speaker at ICSP 2019 (July 2019)
- **Split cuts based on sparse disjunctions**
  MIP2018 (June 2018).
- **The chance-constrained vehicle routing problem**
  Seminar at Duke University (April 2016)
- **The chance-constrained vehicle routing problem**
  Tutte colloquium, University of Waterloo (July 2016)
- **Branch-price-and-cut approaches to some Combinatorial Optimization problems**
  University of Minnesota (July 2013)
- **MIP reformulations of some chance-constrained mathematical programs**
  FIELDS industrial optimization seminar (December 2012)
- **Cutting planes based on multiple rows of a simplex tableau**
  Tutte seminar, University of Waterloo (September 2012)
- **Recent progress in two-rwo cuts**
  Rice university (Feb 2012).
- **Recent progress in two-rwo cuts**
  McMaster University (January 2012).
- **Integer programming models for factoring.**
  IBM IP/AP for lunch. Yorktown Heights, NY, USA. (April 2011).
- **Branch-price-and-cut approaches to some combinatorial optimization problems.**
  Tutte Seminar, University of Waterloo. Waterloo, ON, Canada. (November, 2010).
- **Branch-and-cut-and-price for the time-dependent traveling salesman problem.**
  Continuous Optimization seminar, University of Waterloo. Waterloo, ON, Canada. (February, 2010)
- **MEP123: Master equality polyhedron with one, two or three rows**
  Tutte Seminar, University of Waterloo. Waterloo, ON, Canada. (October, 2009)
- **Single-row mixed-integer programs: Theory and computations.**
  Lehigh University - Dept. of Ind. and Syst. Eng. Bethlehem, PA, USA. (February, 2008)
- **Single-row mixed-integer programs: Theory and computations.**
  University of Waterloo - Dept. of Combinatorics and Optimization. Waterloo, ON, Canada. (February, 2008)
- **Single-row mixed-integer programs: Theory and computations.**
  Argonne National Labs. Argonne, IL, USA. (January, 2008)
- **Single-row mixed-integer programs: Theory and computations.**
  ISYE DOS Seminar at GeorgiaTech. Atlanta, GA, USA. (January, 2008)
- **On the capacitated vehicle routing problem.**
  Universidad de Chile. Santiago, Chile. (April, 2007)

- **Robust Branch-and-cut-and-price and Extended Capacity Cuts.** IBM Research. Yorktown Heights, NY, USA. (Dec, 2006)
- **On a generalization of the master cyclic group polyhedron.**
  IP Seminar, GeorgiaTech. Atlanta, GA, USA. (Oct, 2006) - (presented with title "Polyhedral study of the generalized master knapsack problem.")
- **MIR inequalities, mixed integer knapsack problems and the closure of single row systems**
  IBM IP/AP for Lunch. Yorktown Heights, NY, USA. (July, 2006)

Conferences and Workshops

- **Corner Benders' Cuts**
  Aussois Combinatorial Optimization Workshop (January 2025)
- **Optimal counterfactual explanations for k-Nearest Neighbors using MIP and CP**
  ISMP (July 2024)
- **Optimal counterfactual explanations for k-Nearest Neighbors using Mathematical Optimization and Constraint Programming**
  ISCO (May 2024)
- **Minimum Spanning Tree interdiction and extensions**
  Montreal Optimization Days (May 2024)
- **A fast combinatorial algorithm for the bilevel knapsack problem with interdiction constraints**
  ICERM - Linear and Non-Linear Mixed Integer Optimization (February 2023)
- **The complexity of pricing for the two-stage vehicle routing problem**
  Column Generation Workshop 2023 (May 2023)
- **A fast combinatorial algorithm for the bilevel knapsack problem with interdiction constraints**
  Aussois Combinatorial Optimization Workshop (January 2023)
- **Split cuts based on sparse disjunctions**
  Cutting planes virtual workshop 2021 (August 2021)
- **The Complexity of some Branch-and-price Algorithms for the Capacitated Vehicle Routing Problem with Stochastic Demands**
  INFORMS 2021 (October 2021)
- **Outer-approximation of downward monotone sets via a knapsack**
  CORS 2021 (May 2021)
- **The Complexity of Branch-and-price Algorithms for the Capacitated Vehicle Routing Problem with Stochastic Demands**
  CORS 2021 (May 2021)
- **Improvements on an Exact Algorithm for the Chance-constrained Vehicle Routing Problem**
  ALIO / INFORMS 2019 (June 2019)
- **The Capacitated Vehicle Routing Problem with Stochastic Demands**
  ISMP2018 (July 2018).

- **The chance-constrained vehicle routing problem**
  2018 CAIMS annual meeting (June 2018)
- **A joint routing and speed optimization problem**
  SIAM Conference on Optimization (May 2017)
- **Branch-and-cut (-and-price) for the chance-constrained vehicle routing problem**
  Column Generation Workshop (May 2016)
- **Branch-and-cut (-and-price) for the chance-constrained vehicle routing problem**
  ICSP 2016 (June 2016)
- **Implementing the (not so) Trivial Lifting in Two Dimensions**
  CMS winter meeting (December 2016)
- **Implementing the (not so) Trivial Lifting in Two Dimensions**
  8th Cargese-Porqueroles workshop in combinatorial optimization (August 2017)
- **Exact Algorithms for the Chance-Constrained Vehicle Routing Problem**
  Aussois Combinatorial Optimization workshop (January 2016)
- **On splitting clutters**
  ISMP 2015 (July 2015)
- **A two-slope theorem for the Master Equality Polyhedron**
  CMS winter meeting (December 2015)
- **A two-slope theorem for the Master Equality Polyhedron**
  Poster presentation, MIP 2015 (June 2015)
- **A Comparison Between DP-based Bounds for the TSP**
  INFORMS 2013 (October 2013)
- **An Optimization Algorithm for Cranial Vault Remodeling Surgery**
  INFORMS 2013 (October 2013)
- **Cutting planes for integer programming based on lattice-free sets**
  Retrospective Workshop on Discrete Geometry, Optimization, and Symmetry (November 2013)
- **Improved MIP models for chance-constrained problems with probabilistic right-hand sides**
  ICSP 2013 (July 2013)
- **On the mixing set with a knapsack constraint**
  INFORMS 2013 (October 2013)
- **On the mixing set with a knapsack constraint**
  ISMP 2012 (August 2012)
- **On the mixing set with a knapsack constraint**
  MIP 2012 (July 2012)
- **Experiments with two-row cuts**
  INFORMS 2011 (Nov 2011)
- **Generating two-row cuts from lattice-free bodies**
  SIAM conference on optimization 2011. Darmstadt, Germany (May 2011).

- **On the solution of the time-dependent traveling salesman problem.**
  2nd Engineering Optimization day. Waterloo, ON, Canada. (March, 2010)
- **Branch-and-cut-and-price for the time-dependent traveling salesman problem.**
  SEA 2010. Ischia Island, Naples, Italy. (May, 2010)
- **MEP123: Master equality polyhedron with one, two or three rows**
  INFORMS 2009. San Diego, CA, USA. (October, 2009)
- **MEP123: Master equality polyhedron with one, two or three rows**
  MIP 2009. Berkeley, CA, USA. (June, 2009).
- **Experiments with Extended Capacity Cuts.**
  INFORMS Annual meeting 2008. Washington, DC, USA. (October, 2008)
- **Numerically accurate Gomory mixed-integer cuts.**
  AUSSOIS 2008. Aussois, France. (January, 2008)
- **Numerically accurate Gomory mixed-integer cuts.**
  INFORMS Annual meeting 2007. Seattle, WA, USA. (November, 2007)
- **On a generalization of the master cyclic group polyhedron.**
  INFORMS Annual meeting 2007. Seattle, WA, USA. (November, 2007)
- **On a generalization of the master cyclic group polyhedron.**
  IPCO 2007. Ithaca, NY, USA (June, 2007)
- **MIR inequalities, mixed integer knapsack problems and the closure of single row systems**
  INFORMS Annual meeting 2006. Pittsburgh, PA, USA. (Nov, 2006)
- **MIR inequalities, mixed integer knapsack problems and the closure of single row systems**
  International Symposium on Mathematical Programming, ISMP. Rio de Janeiro, Brazil. (Aug, 2006)
- **Choosing the best cuts (Poster)**
  Poster presentation. MIP 2006. Miami, FL, USA. (June, 2006)
- **Robust branch-and-cut-and-price for the capacitated minimum spanning tree problem.**
  International Symposium on Mathematical Programming, ISMP. Copenhagen, Denmark. (August, 2003)
- **Solving the freight car flow problem to optimality.**
  Algorithmic Methods and Models for Optimization of Railways, ATMOS. Malaga, Spain. (July, 2002)

Other presentations

- **The capacitated vehicle routing problem**
  Undergraduate Research seminar presentation, University of Waterloo (May 2019)
- **A tour of Combinatorics and Optimization**
  Outreach presentation, Auckland Workshop, University of Waterloo (May 2017)
- **Optimization**
  Outreach presentation, Math Circles Workshop, University of Waterloo (November 2016)

- **Recent challenges in Integer Programming**
  Graduate student seminar, University of Waterloo (2015)
- **Optimization and Operations Research**
  Outreach presentation, Auckland Workshop, University of Waterloo (June 2014)
- **Optimization and Operations Research**
  Outreach presentation, Math Circles, University of Waterloo (November 2014)
- **Recent challenges in Mixed Integer Programming**
  Graduate Student seminar, University of Waterloo. Waterloo, ON, Canada. (October, 2010).

Media

2019 Participated in video: "BEYOND Precision: Mathematicians Help Build Better Surgical Plans". Available at: `https://www.youtube.com/watch?v=pclDKSokWcg&t=6s`

2018 Interviewed at MacLeans Magazine, for an article entitled "Teaching efficiency through math at the University of Waterloo"

2014 Interviewed at Ciência Hoje Magazine, for an article entitled "Matemática na cabeça"

Grants, Awards and Honors

Grants

2020-2025	NSERC Discovery Grant	*CAD $52,000 per year*
2018–2019	Waterloo Institute for Nanotechnology (WIN) Interdisciplinary Research Funding Program (WIN-IRFP)	*CAD $50,000 total*
2014–2018	NSERC CRD Grant	*CAD $116,900 total*
2012-2013	NSERC Engage Grant	*CAD $25,000 total*
2014-2018	NSERC Discovery Grant	*CAD $22,000 per year*
2009-2014	NSERC Discovery Grant	*CAD $26,000 per year*
2013-2015	PSI grant	*CAD $40,000*
2013-2014	OCE-TPS grant	*CAD $64,191*

Awards

2023	Mathematical Programming meritorious service award	
2016	Best talk award. Column Generation Workshop	
2012-2017	Early Researcher Award	*CAD $150,000 total*
2008-2009	IBM Herman Goldstine Postdoctoral Fellowship	*US$115,000*
2003-2007	John Morris PhD Fellowship at GeorgiaTech	*US$5,000 per year*
2001	Selected for FAPERJ fellowship as the best first-year student of the Electrical Engineering M.Sc. program	
2000	CNPq Scholarship at M.Sc. program at PUC-Rio	
1997-1998	FAPERJ Scientific Initiation Scholarship	
1995-1996	CNPq Scientific Initiation Scholarship	

1995-1996 Academic Excellence award given to the top students on freshman and sophomore years at undergraduate level

1995-2000 Academic Performance Scholarship, PUC-Rio

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Service

University of Waterloo

2021-2023,2024- Associate Director, Graduate Data Science Program

2020-2023 Member of Computational Mathematics steering committee

2020-2022 Member of Department Advisory Committee on Appointments

2019-2023 Member of Undergraduate committee for C&O

2019-2020 Member of Graduate committee for C&O

2019 Member of department's faculty performance evaluation committee

2016-2019 Associate Chair for Undergraduate studies

2018 Member of Undergraduate strategic plan implementation workgroup

2017 Member of organizing committee for Tutte Distinguished Lecture Series

2015-2017 Representative on Math Faculty 50th anniversary committee

2014 Member of Tenure and Promotion committee

2013-2017 Representative on Computing Advisory Committee

2011-2014 Organizer of the Tutte Colloquium

2009-2011. Science Faculty Council: External member

Editorial service

2019-present Associate Editor for Operations Research Letters

2016-2023 Associate Editor for Operations Research

2021-present Associate Editor for INFOR

2011-present Associate Editor for RAIRO-OR

2011-present Technical Editor for Mathematical Programming Computation

Conferences

2025 Organized cluster "Integer Programming" at INFORMS Computing Society 2025

2024 Organized stream "Mixed integer linear Programming" at ISMP 2024

2024 Member of program committee for ISCO 2024

2022 Member of program committee for IPCO 2022

2022 Member of program committee for ISCO 2022

2019 Organized session "Stochastic Integer Programming: Theory and applications" at ALIO/INFORMS international meeting 2019

2018 Organized session "Exact approaches for vehicle routing and variants" at ISMP 2018

2017 Member of local organizing committee for IPCO 2017

2017 Member of Best poster committee for MIP 2017

2016 Organized session "Combinatorial, Geometric, and Computational Aspects of Optimization" at CMS Winter meeting 2016.

2015 Organized session "Provably strong formulations" at ISMP 2015.

2016-2024 Member of program committee for ISCO 2016, 2018, 2024.

2012 Cluster organizer for CORS 2012.

2012 Member of organizing committee for conference "Matchings, Matroids and Extensions" at University of Waterloo

2012 Organized session "Computational Integer Programming" at ISMP 2012.

2011 Organized session "Integer Programming" at INFORMS 2011.

2011 Member of the organizing committee (program and local) for MIP2011.

2010 Member of the organizing committee (program) for MIP2010.

2010 Organized session "Integer Programming" at INFORMS 2010.

2009 Organized session "Computational Integer Programming" at INFORMS 2009.

2009 Organized session "Advances in Integer Programming" at INFORMS 2009.

2009 Organized session "Computational Integer Programming I" at INFORMS 2008.

Other service

2022 Member of INFORMS ad-hoc committee on Ethics.

2022 Chair of INFORMS Computing society prize committee.

2015-2016 Member of committee for INFORMS Nicholson Prize award, 2015 and 2016.

Referee

Journals

4OR: A Quarterly Journal of Operations Research

Annals of Operations Research

Computational Optimization and applications

Discrete Optimization

European Journal of Operations Research

INFORMS Journal on Computing

Mathematical Programming Series A and B

Mathematical Programming Computation

Networks

Operations Research

Operations Research Letters

Optimization Letters

SIAM Journal on Discrete Mathematics

Transportation Science

Transportation Research Part B

Conferences

International Conference on Pattern Recognition (ICPR)

European Symposium on Algorithms (ESA)

Integer Programming and Combinatorial Optimization conference - IPCO

Latin-American Algorithms, Graphs and Optimization Symposium - LAGOS

Symposium on Experimental Algorithms (formerly WEA)

Grant reviews

NSERC

Fondecyt

Student, postdocs and other supervision

Graduated PhD students

08/2012-08/2017 **Alinson Xavier:** Graduate student, PhD (completed), University of Waterloo. Subsequent position: Researcher at Argonne National Labs, USA.

09/2017-08/2022 **Kavitha Menon:** Graduate Student, Phd, University of Waterloo. Co-supervised with L. Ricardez Sandoval. Subsequent position: Postdoctoral researcher at Argonne National Labs, USA

2015-2022 **Mauro Henrique Mulati:** Graduate Student, Phd, Unicamp. Co-supervised with F. K. Miyazawa. Subsequent position: Professor at UNICENTRO

Current PhD students

01/2021-current **Matheus Ota:** Graduate Student, PhD, University of Waterloo.

01/2022-current **Noah Weninger:** Graduate Student, PhD, University of Waterloo.

Graduated Masters students

08/2020-08/2022 **Elvis Iam:** Graduate Student, MMath, University of Waterloo. Subsequent position: unknown

08/2020-08/2022 **Mathieu Rundstrom:** Graduate Student, MMath, University of Waterloo. Subsequent position: PhD student at UWaterloo

01/2019-12/2020 **Marina Drygala:** Graduate Student, MMath, University of Waterloo. Subsequent position: PhD student at EPFL Lausanne

09/2018-07/2020 **Joshua Gunter:** Graduate Student, MMath, University of Waterloo. Subsequent position: RideCo

09/2019-12/2020 **Vincent Luong:** Graduate Student, MMath, University of Waterloo. Subsequent position: unknown

09/2019-07/2020 **Riley Becker:** Graduate Student, MMath, University of Waterloo. Subsequent position: unknown

09/2017-04/2020 **Daniel Oliveira:** Graduate Student, MMath, University of Waterloo. Subsequent position: RideCo

09/2016-06/2019 **Zachariah Stevenson:** Graduate Student, MMath, University of Waterloo. Subsequent position: Systems Infrastructure Analyst at Payments Canada.

09/2016-06/2019 **Shenghao Yang:** Graduate Student, MMath, University of Waterloo. Subsequent position: Graduate student at University of Toronto.

09/2015-08/2018 **Do Yeon Lee:** Graduate Student, MASc, University of Waterloo. Subsequent position: Consultant at Delbridge Solutions

08/2013-08/2015 **Xiaojing Wang**. Graduate student, MMath, University of Waterloo. Subsequent position: PhD student at University of Waterloo.

02/2013-02/2015 **Bhushan Patil:** Graduate Student, MASc, University of Waterloo. Subsequent position: Process and Applications Engineer at Eco-Tec Inc.

09/2014-08/2016 **Saman Lagzi:** Graduate Student, MMath, University of Waterloo. Subsequent position: PhD student at University of Toronto.

09/2011-06/2013 **David Qian:** Graduate Student, MMath, University of Waterloo. Subsequent position: Amazon.

09/2010-07/2012 **Marco Blanco Sandoval:** Graduate Student, MMath, University of Waterloo. Subsequent position: PhD student at ZIB.

09/2009-08/2010 **John Lincoln White:** Graduate Student, MMath, University of Waterloo. Subsequent position: Application Developer at Global Information Systems, LLC.

Current Masters students

08/2023-current **Sina Kalanterzadeh:** Graduate Student, MMath, University of Waterloo.

Postdoctoral supervision

04/2023- **Preeti Rathi:** Postdoc, University of Waterloo.

06/2021- **Daniela Lubke:** Postdoc, University of Waterloo.

09/2018-08/2019 **Suh Young Lee:** Postdoc, University of Waterloo. Subsequent position: Unknown

02/2018-05/2018, 01/2015-12/2015, 05/2017-11/2017 **Fernando Afonso Santos:** Postdoc, University of Waterloo. Subsequent position: Magnet Forensics

11/2013-12/2016 **Laurent Poirrier:** Postdoc, University of Waterloo. Subsequent position: Research Assistant Professor at University of Waterloo.

Undergraduate research assistants

05/2023-07/2023 **Thomas Snow:** Undergraduate Student, URA, University of Waterloo.

09/2022-12/2022 **Danick Carrier:** Undergraduate Student, Co-op, University of Waterloo.

09/2021-08/2022 **Tina Wan:** Undergraduate Student, URA, University of Waterloo.

01/2021-04/2021 **Haoyang Qi:** Undergraduate Student, Co-op, University of Waterloo.

01/2021-04/2021 **Chris Firmani:** Undergraduate Student, Co-op, University of Waterloo.

05/2020-08/2020 **Emily Bi:** Undergraduate Student, Co-op, University of Waterloo.

05/2019-08/2019 **Brendan Ross:** Undergraduate Student, URA, University of Waterloo.

01/2019-08/2019 **Chris Woodbeck:** Undergraduate Student, URA, University of Waterloo.

05/2018-08/2018 **Jessie Yeung:** Undergraduate Student, URA, University of Waterloo.

05/2014-08/2014 **Allan Sapucaia Barboza:** Undergraduate Student, URA, University of Waterloo.

05/2012-08/2012 **Patricia Hongo:** Undergraduate Student, URA, University of Waterloo.

05/2012-08/2012 **Ruan Silva:** Undergraduate Student, URA, University of Waterloo.

09/2011-03/2013 **Ahmad Abdi:** Undergraduate Student, URA, University of Waterloo.

Other supervision

09/2019-05/2022 **Chris Woodbeck:** Research Assistant, University of Waterloo.

04/2013-09/2013 **Devanshu Pandey:** Research Assistant, University of Waterloo. Subsequent position: Big Data developer at Bell Canada.

08/2012-04/2016 **Cynthia Villalobos:** Graduate student, PhD, University of Waterloo. Subsequent position: PhD student with Prof. James Geelen (switched supervisors).

09/2009-01/2010 **Abbas Mehrabian:** Graduate Student, MMath, University of Waterloo. Subsequent position: MMath student with Prof. Nick Wormald (switched supervisors).

Thesis committee member

2024 Member of Phd thesis committee of Danielle Attara Ripsman, Combinatorics and Optimization, University of Waterloo

2024 Member of Phd thesis committee of Madison VanDyk, Combinatorics and Optimization, University of Waterloo

2023 Reader of MMath thesis of Alice Sayitina, Combinatorics and Optimization, University of Waterloo

2023 Reader of MMath thesis of David Kalichman, Combinatorics and Optimization, University of Waterloo

2023 Reader of MMath thesis of Paul Lawrence, Combinatorics and Optimization, University of Waterloo

2023 Reader of MMath thesis of Jeffrey Chang, Combinatorics and Optimization, University of Waterloo

2022-2023 Member of evaluating committee for habilitation degree of Jeremy Omer, Universite de Rennes

2022 Member of Phd thesis committee of Sean Kafer, Combinatorics and Optimization, University of Waterloo

2022 Member of Phd thesis committee of Mahmoud Abouamer, ECE department, University of Waterloo

2021 Member of Phd thesis committee of Gohram Baloch, Man Sci department, University of Waterloo

2022 Reader of MMath thesis of Salomon Bendayan, Combinatorics and Optimization, University of Waterloo

2021 Reader of MMath thesis of Alexander Stoll, Combinatorics and Optimization, University of Waterloo

2021 External Committee member of PhD thesis proposal of Yuhao Zhang, ECE department, University of Waterloo

2021 Reader of MMath thesis of Zouhaier Ferchiou, Combinatorics and Optimization, University of Waterloo

2020 Member of PhD thesis proposal for Hao Sun, Combinatorics and Optimization, University of Waterloo

2020 Reader of MMath thesis of Ishan Bansal, Combinatorics and Optimization, University of Waterloo

2018 External Committee member of PhD thesis proposal of Gohram Baloch, Management Sciences, University of Waterloo

2018 External Committee member of MSc thesis of Manuel Tejeda Iglesias, Chemical Engineering, University of Waterloo

2017 Reader of MMath thesis of Charupriya Sharma, Combinatorics and Optimization, University of Waterloo

2017 Reader of MMath thesis of Christos Stratopolous, Combinatorics and Optimization, University of Waterloo

2016 Reader of MMath thesis of Hao Sun, Combinatorics and Optimization, University of Waterloo

2016 Internal/external member in PhD committee for Francis Chen, Computer Science, University of Waterloo

2014 Reader of MMath thesis of Venus Lo, Combinatorics and Optimization, University of Waterloo

2014 Reader of MMath thesis of Jiaxin Liu, Combinatorics and Optimization, University of Waterloo

2010 Reader of MMath thesis of Derya Demirtas, Combinatorics and Optimization, University of Waterloo

Other committees

2024 Member of second stage comprehensive exam of David Aleman Espinoza, Combinatorics and Optimization, University of Waterloo

2020 Member of second stage comprehensive exam for Hao Sun, Combinatorics and Optimization, University of Waterloo

2020 Member of Phd Comprehensive background examination committee for Yuhao Zhang (ECE department)

2019 First stage comprehensive exam committee for Combinatorics and Optimization Department

2019 Member of Phd Comprehensive background examination committee for Mohammed Almoneer (ECE department)

2017 First stage comprehensive exam committee for Combinatorics and Optimization Department