

Ricardo Fukasawa

Curriculum Vitae

Department of Combinatorics & Optimization. 200 University Avenue West
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Areas of Interest

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

Education

- 08/2003–**Ph.D in Algorithms, Combinatorics and Optimization (ACO)**, *GeorgiaTech*.
08/2008 GPA: 4.0/4.0
- 07/2000–**M.Sc. in Electrical Engineering**, *PUC-Rio*.
07/2002 Emphasis on Decision Support Methods. GPA: 9.9/10.0
- 03/1995–**Bachelor of Science in Electrical Engineering**, *PUC-Rio*.
07/2000 Emphasis on Decision Support Methods GPA: 8.9/10.0

Work Experience

- 07/2013–**Associate Professor**, *University of Waterloo*, Waterloo, Canada.
present
- 08/2009–**Assistant Professor**, *University of Waterloo*, Waterloo, Canada.
06/2013
- 08/2008–**Herman Goldstine Postdoctoral fellow**, *IBM Research*, Yorktown Heights, NY.
07/2009
- 08/2003–**Graduate Research Assistant**, *Georgia Institute of Technology*, Atlanta, GA.
07/2008
- 05/2006–**Summer intern**, *IBM Research*, Yorktown Heights, NY.
07/2006
- 05/2004–**Summer manager**, *AT&T Research Labs*, Florham Park, NJ.
08/2004
- 07/2000–**Optimization manager**, *GAPSO Inc*, Rio de Janeiro, Brazil.
06/2003

Teaching Experience

- **Fundamentals of Optimization.** University of Waterloo
Grad course. Terms: Fall 2018.
- **Combinatorial Optimization.** University of Waterloo
Undergrad/Grad course. Terms: Fall 2011, Fall 2015.
- **Integer Programming.** University of Waterloo
Undergrad/Grad course. Terms: Winter 2011, Winter 2017, Winter 2019.
- **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.
- **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.
- **Engineering Optimization.** GeorgiaTech
Undergraduate course. Fall 2007.

Publications

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Presentations

Invited presentations

- **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

- **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-Porquerolles 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=pc1DKSokWcg&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

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|-----------|--|------------------------------|
| 2018–2019 | Waterloo Institute for Nanotechnology (WIN) Interdisciplinary Research Funding Program (WIN-IRFP) | <i>CAD \$50,000 total</i> |
| 2014–2018 | NSERC CRD Grant | <i>CAD \$116,900 total</i> |
| 2012–2013 | NSERC Engage Grant | <i>CAD \$25,000 total</i> |
| 2014–2018 | NSERC Discovery Grant | <i>CAD \$22,000 per year</i> |
| 2009–2014 | NSERC Discovery Grant | <i>CAD \$26,000 per year</i> |
| 2012–2017 | Early Researcher Award | <i>CAD \$150,000 total</i> |
| 2013–2015 | PSI grant | <i>CAD \$40,000</i> |
| 2013–2014 | OCE-TPS grant | <i>CAD \$64,191</i> |

Awards

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|-----------|---|---------------------------|
| 2008–2009 | IBM Herman Goldstine Postdoctoral Fellowship | <i>US\$115,000</i> |
| 2003–2007 | John Morris PhD Fellowship at GeorgiaTech | <i>US\$5,000 per year</i> |
| 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

Service

University of Waterloo

- 2019-2020 Member of Graduate committee for C&O
- 2019-2020 Member of Undergraduate committee for C&O
- 2019 Member of 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-present Associate Editor for Operations Research
- 2011-present Associate Editor for RAIRO-OR
- 2011-present Technical Editor for Mathematical Programming Computation

Conferences

- 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.
- 2015-2016 Member of committee for INFORMS Nicholson Prize award, 2015 and 2016.
- 2016,2018 Member of program committee for ISCO 2016 and ISCO 2018.
- 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.

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

[Current PhD students](#)

09/2017- **Daniel Oliveira:** Graduate Student, PhD, University of Waterloo.
current

09/2017- **Kavitha Menon:** Graduate Student, PhD, University of Waterloo.
current

[Graduated Masters students](#)

09/2016- **Zachariah Stevenson:** Graduate Student, MMath, University of Waterloo. Subse-
06/2019 quent position: Unknown.

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

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

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

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

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

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

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

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

[Current Masters students](#)

09/2019- **Vincent Luong:** Graduate Student, MMath, University of Waterloo.
current

09/2019- **Riley Becker:** Graduate Student, MMath, University of Waterloo.
current

09/2018- **Joshua Gunter:** Graduate Student, MMath, University of Waterloo.
current

01/2019- **Marina Drygala:** Graduate Student, MMath, University of Waterloo.
current

[Postdoctoral supervision](#)

09/2018- **Suh Young Lee:** Postdoc, University of Waterloo.
current

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

01/2015-
12/2015,
05/2017-
11/2017

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

[Undergraduate research assistants](#)

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

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

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

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

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

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

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

[Other supervision](#)

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

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

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

[Thesis committee member](#)

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](#)

- 2019 First stage comprehensive exam committee
- 2017 First stage comprehensive exam committee