Christopher Thomas Ryan (May 16, 2024)

Contact Information

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Research Interests: optimization, game theory, theoretical economics, video games, small business operations, history and philosophy of management, business pedagogy

Employment

University of British Columbia, Sauder School of Business

Advisory Council Chair in Management Science July 2022-present.
Associate Professor (with tenure) July 2021 – present.
Assistant Professor September 2019 – June 2021.

University of Chicago Booth School of Business

Associate Professor of Operations Management July 2016 – August 2019.
Assistant Professor of Operations Management July 2010 – June 2016.

Colibri Learning Foundation (colibrilearning.org)

Curriculum development and discussion leadership training (volunteer positions) 2005 – present.

Education

University of British Columbia

Ph.D., Sauder School of Business, 2010

- Dissertation Topic: “Computing solution concepts in games with integer decisions"
- Advisor: Maurice Queyranne

B.A. (honors), Mathematics, 2005

University of Guelph

B. A. (honors), Sociology and Economics, (transferred to UBC in September 2002)

Research Papers

(the labels that follow, e.g., (J-3) refer to the labels of the projects listed below.)

Infinite-dimensional optimization: (J-9), (J-11), (J-18), (J-19), (J-20), (J-21), (J-22), (J-6), (J-3), (WIP-3), (S-2)

Discrete optimization: (J-13), (J-14), (J-23), (J-24), (J-6), (J-3)

Other optimziation: (J-12), (WP-1)

Learning: (J-7), (C-1), (WIP-1)

Game theory and theoretical economics: (J-13), (J-15), (J-16), (J-23), (J-24), (C-2), (J-4), (J-2)

Operations management and revenue management: (J-10), (R-4), (R-1), (R-2), (WP-5), (WP-3), (WP-4), (R-3),

Video games: (J-5), (J-8), (J-1),(R-5), (S-1), (WP-2), (WIP-4)

Published or forthcoming journal publications

(J-1) C.T. Ryan, L. Sheng, and X. Zhao. Strategic timing and pricing for selling bonus actions in video games. To appear in *Management Science*

(J-2) S. Kiatsupaibul, G. Pedrielli, C.T. Ryan, R.L. Smith, and Z.B. Zabinsky. Monte Carlo fictitious play for finding a Nash equilibrium of an identical interest game. To appear in *INFORMS Journal on Optimization*

(J-3) C.T. Ryan, R.L. Smith, and M.A. Epelman. Minimum spanning trees in infinite graphs: Theory and Algorithms. To appear in *SIAM Journal on Optimization*.

(J-4) Y.K. Che, J. Kim, F. Kojima, and C.T. Ryan. "Near" Weighted Utilitarian Characterizations of Pareto Optima.*Econometrica*, Volume 92(1), 141-165.

(J-5) Y. Li, C.T. Ryan, and L. Sheng (2023). Optimal sequencing in single-player games. *Management Science*, 69(10), 6057-6075.

(J-6) C.T. Ryan and R.L. Smith (2022). A greedy algorithm for finding maximum spanning trees in infinite graphs. *Operations Research Letters*, 50(6), 655–659.

(J-7) Y. Feng, R. Caldentey, and C.T. Ryan (2022). Robust learning of consumer preferences. *Operations Research*, 70(2), 918–962.

(J-8) L. Sheng, M. Nagarajan, C.T. Ryan, Y. Cheng and C. Tong (2022). Incentivized actions in freemium games. *Manufacturing & Service Operations Management*, 24(1), 275–284.

(J-9) A. Ghate, C.T. Ryan, and R.L. Smith (2021). A simplex method for countably-infinite linear programs. *SIAM Journal on Optimization*, 31(4), 3157–3183.

(J-10) T. Dai, R. Ke, and C.T. Ryan (2021). Incentive design for marketing-operations multitasking. *Management Science*, 67(4), 2211–2230.

(J-11) C.T. Ryan and R.L. Smith (2021). Dual-based methods for solving infinite-horizon nonstationary deterministic dynamic programs. *Mathematical Programming*, 187(1), 253–285.

(J-12) X. Chen, S. He, B. Jiang, C.T. Ryan, and T. Zhang (2021). The discrete moment problem with nonconvex shape constraints. *Operations Research*, 69(1), 279–296.

(J-13) A. Basu, C.T. Ryan, and S. Sankaranarayanan (2021). Mixed-integer bilevel representability. *Mathematical Programming*, 185(1), 163–197.

(J-14) A. Basu, K. Martin, C.T. Ryan, and G. Wang (2019). Mixed-Integer Linear Representability, Disjunctions, and Chvátal Functions—Modeling Implications. *Mathematics of Operations Research*, 44(4), 1264—1285.

(J-15) R. Ke and C.T. Ryan (2018). A general solution method for moral hazard problems. *Theoretical Economics*, 13(3), 1425—1481.

(J-16) R. Ke and C.T. Ryan (2018). Monotonicity of optimal contracts without the first order approach. *Operations Research*, 66(4), 1101–1118.

(J-17) Y. Ding, D. Ge, S. He and C.T. Ryan (2018). A non-asymptotic approach to analyzing kidney exchange graphs. *Operations Research*, 66(4), 918–935.

(J-18) C.T. Ryan, R.L. Smith, and M. Epelman (2018). A simplex method for uncapacitated pure-supply infinite network flow problems. *SIAM Journal on Optimization*, 28(3), 2022–2048.

(J-19) A. Basu, K. Martin and C.T. Ryan (2017). Strong duality and sensitivity analysis in semi-infinite linear programming. *Mathematical Programming*, 161(1-2), 451–485.

(J-20) K. Martin, C.T. Ryan and M. Stern (2016). The Slater conundrum: Duality and pricing in infinite dimensional optimization. *SIAM Journal on Optimization*, 26(1), 111–138.

(J-21) A. Basu, K. Martin, and C.T. Ryan (2014). Projection: A unified approach to semi-infinite linear programs and duality in convex programming. *Mathematics of Operations Research*, 40(1), 146–170.

(J-22) A. Basu, K. Martin, and C.T. Ryan (2013). On the sufficiency of finite support duals in semi-infinite linear programs. *Operations Research Letters*, 42(1), 16–20.

(J-23) M. Köppe, C.T. Ryan, and M. Queyranne (2011). Rational generating functions and integer programming games. *Operations Research*, 59(6), 1445–1460.

(J-24) M. Köppe, M. Queyranne and C.T. Ryan (2010). Parametric integer programming algorithm for bilevel mixed integer programs. *Journal of Optimization Theory and Applications*, 146(1), 137–150.

Published peer-reviewed conference proceedings

(C-1) W. Guo, Y. Hur, T. Liang, and C.T Ryan (2022). Online learning to transport with the minimal selection principle. *COLT 2022*.

(C-2) C.T. Ryan, A. X. Jiang and K. Leyton-Brown (2010). Computing pure strategy Nash equilibria in compact symmetric games. *EC 2010*.

Under revision

(R-1) R. Chen, B. Jiang, C.T. Ryan, and N. Zhang. A data-driven approach to modeling assortment optimization: The tractable case of similar substitutes.

(R-2) M. Zhang, C.T. Ryan, W. Sun, S. Subramanian and M. Ettl. Attribute-based pricing: A novel formulation and convergent algorithms.

(R-3) J. Han, C.T. Ryan, and X.T. Tong. Algorithms for loot box design.

(R-4) H.-S. Ahn, C.T. Ryan, J. Uichanco, and M. Zhang. Certainty-equivalent pricing with dependent demand and limited price-changing opportunities.

(R-5) O. Hanguir, J. Han, W. Ma, and C.T. Ryan. Designing optimization problems with diverse solutions.

Submitted papers

(S-1) Y. Li, C.T. Ryan, L. Sheng, and B. Wong. Optimal world design in video games.

(S-2) J. Han, C.T. Ryan, and X.T. Tong. Wasserstein gradient flow for optimal probability measure decomposition.

Working papers

(WP-1) R. Ke, C.T. Ryan, and J. Zhang. A max-min reformulation approach to nonconvex bilevel optimization.

(WP-2) C. Lam, C.T. Ryan, and M.X. Wu. Managing the release of consumable digital goods in freemium games

(WP-3) S. He, M. Zheng, C.T. Ryan, D. Yao. Operational transparency: Showing we are different

(WP-4) J. Han, T. Huh, and C.T. Ryan. Allocating marketing effort under customer discrimination

(WP-5) H.-S. Ahn, C.T. Ryan, J. Uichanco, and M. Zhang. Valuing influence.

Work in progress

(WIP-1) V. Nourani and C.T. Ryan. Multi-object social learning and technology adoption in Ghana: Learning from friends and reacting to acquaintances.

(WIP-2) R. Ke and C.T. Ryan. Information trigger contracts.

(WIP-3) C.T. Ryan and R.L. Smith. On the definition of infinite-dimensional polytopes.

(WIP-4) R. Fu, C.T. Ryan, and M. Zhang. Learn or signal for lean startups.

Case studies

(CS-1) K. Ferriera, C.T. Ryan, and S. Mehta. ReUp Education: Can AI Help Learners Return to College? Harvard Business School Case 624-007, October 2023.

Grants, Honors and Awards

Sauder School of Business, CPA Graduate Teaching Award, 2022

Sauder School of Business, Junior Faculty Research Award, 2020

Sauder School of Business Exploratory Research Grant, 2020-2022

Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grant, 2020-2025

Booth School of Business, Faculty Excellence Award for teaching in the Evening and Weekend MBA program, 2018

Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship, 2005-2009

Shelby L. Brumelle Memorial Scholarship, 2008-2009

NSERC Undergraduate Student Research Award, 2004

Chancellor's Entrance Scholarship, University of British Columbia, 2002-2005

Canada Post Corporation Scholarship, 1998-2001

Board of Governor's Scholarship, University of Guelph, 1998-2001

Governor General Bronze Medal, 1998. Top graduating student from Penticton Secondary School.

Presentations

Plenaries

2021: INFORMS Speaker Series Webinar

Invited seminars

2024: Google Research—Cambridge, UT Austin (McCoombs), Harvard Business School TOM Unit, University of Florida ISOM workshop, Harvard Business School Case Writing Group, Columbia (DRO), Columbia Economics (PER short course), CMU (Tepper), Western (Ivey), Johns Hopkins (Carey), Stanford (MS&E) (scheduled)

2023: University of Virginia (Darden), University College London, London Business School, MIT (DSL)

2022: Penn State, Virginia Tech INFORMS student chapter

2021: Arizona State University, University of British Columbia (Institute for Applied Mathematics), Dartmouth (Tuck), Shanghai Jiaotong, Xian Jiaotong-Liverpool, NYU Shanghai, National University of Singapore, Virginia Tech INFORMS student chapter, University of Illinois-Chicago, Boston College

2020: CMU Tepper, University of British Columbia (Vancouver School of Economics), University of British Columbia (Sauder)

2019: Washington University in Saint Louis, UT Austin, University of Florida, Chinese Academy of Science, Central University of Finance and Economics, Beijing Normal University, Rice, Columbia (joint IEOR-DRO)

2018: University of Toronto (Rotman), Johns Hopkins (Carey), Harvard Business School, Chinese Academy of Science (Institute for Computational Mathematics), Hong Kong Baptist University (Economics), Minzu University, University of Wisconsin-Madison (Business School and Industrial Engineering), Duke Fuqua, University of Michigan (Ross and IOE), UCLA (Anderson), MIT (IDSS), University of Virginia (Darden), Cornell (Johnson), Wake Forest (Business School), University of British Columbia (Sauder), University of Alberta (Business School)

2017: University of Southern California (ISE), University of British Columbia (Sauder), Simon Fraser University (Mathematics), University of Chicago (Booth)

2016: University of Kansas, University of Washington (IE), University of Waterloo (Management Sciences), University of Toronto (IE), University of British Columbia

2015: Chinese University of Hong Kong (Economics), University of Alberta

2014: New York University, University of California-Irvine, Northwestern University, University of Michigan-Ann Arbor (IOE), Georgia Tech (ISyE), CMU Tepper, Shanghai University of Finance and Economics, Massachusetts Institute of Technology, Haverford College (Mathematics), University of Indiana-Bloomington (Telecommunications), University of Minnesota (ISyE), University of British Columbia-Okanagan (Mathematics)

2012: University of British Columbia, Universidad de Chile, Chinese Academy of Science

2010: University of Southern California, University of Chicago, New York University, MIT

2009: Chinese Academy of Science, Peking University, University of California-Davis

2008: University of British Columbia, Simon Fraser University, University of Washington, University of Magdeburg

Invited conference presentations

2023: POMS, INFORMS Annual Meeting, SIAM Conference on Optimization (SIOPT), IPCO

2022: Mixed Integer Programming workshop (MIP)

2019: POMS, INFORMS Annual Meeting

2018: INFORMS Optimization, POMS, International Symposium of Mathematical Programming (ISMP), INFORMS Annual Meeting

2017: SIAM Conference on Optimization (SIOPT), INFORMS Annual Meeting

2016: International Conference on Continuous Optimization (ICCOPT), INFORMS Annual Meeting

2015: INFORMS Annual Meeting, International Symposium of Mathematical Programming

(ISMP)

2014: INFORMS Annual Meeting, Manufacturing and Services Operations Management (MSOM), SIAM Conference on Optimization (SIOPT)

2012: INFORMS Annual Meeting, ISMP

2010: Behavioral and Quantitative Game Theory, INFORMS Annual Meeting

2009: ISMP, American Mathematical Society (AMS) Spring Western Section Meeting, San Francisco, 25–26 April 2009.

2008: American Mathematical Society (AMS) Fall Western Section Meeting

Teaching Experience

University of British Columbia

Instructor **Mar-Apr, 2022,3**
Operations (BASC 550). Master's of management (MM) required course.

Instructor **Jan-Apr, 2022**
Advanced Topics in Optimization (COMM 612). Infinite dimensional optimization. PhD course.

Instructor **Nov-Dec 2019, 2021-2022, Mar-April 2021**
Operations (BASC 550). Full time MBA required course.

Instructor **Nov-Dec 2019-2022**
Supply chain management (BASC 523). MMDD (Master's of Managment Dual Degree) required course.

Instructor **Sep-Oct 2020, Nov-Dec 2021, Jun-July 2022**
Operations (BASC 550). PMBA (professional MBA) required course.

Instructor **June and Dec, 2022**
Supply chain management (BASC 523). IMBA (International MBA) required course.

Instructor **Sep-Oct 2022**
Supply chain management (BASC 523). PMBA (professional MBA) required course.

Instructor **Mar-Apr 2023**
Supply chain management (BASC 523). Full time MBA elective.

Instructor **Mar-Apr 2023**
Supply chain management (BASC 523). MBAN (Master's of Business Analytics) required course.

Instructor **Jan-Mar 2020, Sep-Oct 2020**
Optimization theory and applications (COMM 616). Convex analysis. PhD course.

Instructor **May-June 2009**
Logistics and Operations Management (COMM 399). Undergraduate.

Instructor **Jan - Apr, 2008**
Applications of Statistics in Business (COMM 291). Undergraduate.

University of Chicago

Instructor **Jan-Mar, Sep-Dec 2017, Apr-June 2019**
Managing Service Operations (BUS 40110) MBA program.
- Developed case materials in collaboration with multiple companies for course projects in the course, including with former Booth students with startups.

Instructor **Mar-June 2011, 2012, 2013, 2015 Sep-Dec, 2013, 2015**
Operations Management: Business Process Fundamentals (BUS 40000) MBA program.

Instructor **Mar-Apr 2016**
Combinatorial Optimization (BUS 40610) PhD program.

Instructor **Jan-Mar 2012, Apr-June 2014, 2019**
Optimization in Topological Vector Spaces (BUS 36904 Special Topics in Management Science). PhD program.

Case studies

In development

ezza Nails (with Kim Marsh and Lindsey Joseph)

Advocate Children's Sleep Network (with Darius Loghmanee, Matthew Balog, and Noah Hamilton)

VOCEL: Early Childhood Education in Chicago (with Kelly Powers and Victoria Lansdown)

The Minte: Hotel-Style Housekeeping (with Kat Wilson and Melanie Jackson)

BrewBike (with Randy Paris and Hariharan Mahadevan)

Kumwe Harvest: Social enterprise in Rwanda (with Cyril Khamsi and Alex Sanderson)

Susgrainable (with Jeffrey Ma)

Service

Editorial positions
Associate editor at *Operations Research Letters* (2019-2022)
Associate editor at *Management Science* (2020-2023)

Program Committees
ACM Conference on Economics and Computation 2018 (ACM-EC'18)
Workshop on Operations of People-Centric Systems at EC'21 (ACM-EC'21)

Ad-hoc reviewer
Operations Research, Management Science, Manufacturing & Service Operations Manage-

ment, Production and Operations Management, Mathematics of Operations Research, Econometrica, Journal of Mathematical Economics, Games and Economic Behavior, Mathematical Programming, SIAM Journal on Optimization, INFORMS Journal of Computing, European Journal of Operational Research, International Journal of Game Theory, Networks, Journal of Mathematical Economics, Operations Research Letters, Economics Letters, Journal of Combinatorial Optimization, Workshop in Networks and Economics (WINE), Optimization Letters, Healthcare Management Science, IISE Transactions

INFORMS Early Career Teachers Network (2023)

NSF panelist (2015)

NSERC Discovery Grant reviewer (2017, 2018, 2021)

PhD students (advisor|co-advisor role)
Jiangze Han (UBC), Nanxi Zhang (SUFE, advisor during one year visit to UBC, current academic position: Ivey School of Business, Assistant Professor), Meng Zheng (SUFE, advisor during one year visit to UBC), Navid Jaberi (UBC, interdisciplinary studies with sociology)

PhD committee member
Vishal Ahuja (Booth, current academic position: Southern Methodist University, Associate Professor), Xiao Wu (Booth, current academic position: MIT Data Science Lab), Angelo Mancini (Booth), Matt Stern (Booth), Lifei Sheng (UBC, current academic position: University of Houston, Clear Lake, Assistant Professor), Yifan Feng (Booth, current academic position: National University of Singapore, Assistant Professor), Mengzhenyu Zhang (UMichigan Ross, current academic position: UCL, Assistant Professor), Meichun Lin (UBC, current academic position: Singapore Management University, Assistant Professor), Zi (Elaine) Ling (Booth)

Academic mentor to undergraduate students, with most recent academic position indicated
Runshan Fu (NYU Stern, assistant professor of Marketing), Mengzhenyu Zhang (UCL, Assistant Professor of Operations Management), Jiding Zhang (Arizona State University, Assistant Professor of MIS), Teng Zhang (graduated with PhD from Stanford MS&E), Wenjia Ba (UBC Sauder, Assistant Professor of Marketing), Tongxin Zhou (Arizona State Univeristy, Assistant Professor of MIS), Ren Yi (graduated at Columbia University in IEOR), Siyue Liu (PhD student at CMU Tepper in Operations Research), Ethan Che (PhD student at Columbia Business School in Operations)

Conference organization
Mixed Integer Programming Workshop (local committee, hosted at Gleacher Center, University of Chicago, 2015)

INFORMS-CORS International Conference (program committee, Vancouver, 2022)

INFORMS Annual Meeting (Committee's Choice Co-Chair, Seattle, 2024)