

Ryan Cory-Wright

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Academic Appointments

Imperial College London, Imperial College Business School London, UK
Assistant Professor of Analytics and Operations Jul. 2023-present
Affiliated Faculty, Imperial-X AI Initiative Jul. 2023-present

IBM Research, MIT-IBM Research Lab Cambridge, MA
Herman Goldstine Postdoctoral Fellow Jul. 2022-Jun. 2023

Education

Massachusetts Institute of Technology, Operations Research Center Cambridge, MA
PH.D. IN OPERATIONS RESEARCH Sept. 2017-May. 2022
Thesis committee: Dimitris Bertsimas (advisor), Alexandre Jacquillat, Robert Freund
Thesis: Integer and matrix optimization: A nonlinear approach | [Link to 5-page summary](#) | GPA: 5.0/5.0

University of Auckland, Faculty of Engineering Auckland, New Zealand
B.E. (1ST CLASS HONORS) IN ENGINEERING SCIENCE Feb. 2014-Oct. 2016
Four-year degree completed in three years via accelerated pathway initiative (extra class per semester)
Thesis: Pricing wind under uncertainty | Advisors: Andy Philpott, Golbon Zakeri
Senior Scholar Award (top of graduating class)

Research Interests

- **Optimization:** integer, semidefinite, conic, polynomial, under uncertainty
- **Machine learning and statistics:** interpretability, scientific discovery, cross-validation, low-rank
- **Applications:** business analytics, energy (decarbonization, pricing schemes), finance

Honors and Awards

- 2024 **Meritorious Reviewer Award**, INFORMS Journal on Computing
- 2024 **Outstanding Technical Accomplishment Award**, IBM
- 2023 Honorable Mention, **Student Paper Award**, MIT ORC (Digalakis Jr.)
- 2023 Finalist, **Practice-Based Research Competition**, M&SOM Society
- 2022 **IBM Herman Goldstine Fellowship**, IBM Department of Mathematical Sciences
- 2021 First place, **Student Paper Award**, INFORMS Data Mining Society
- 2020 First place, **George Nicholson Student Paper Award**, INFORMS
- 2020 First place, **Pierskalla Paper Award**, INFORMS Health Applications Society
- 2019 First place, **Student Paper Award**, INFORMS Computing Society
- 2017 **Senior Scholar Award** (top of graduating class), University of Auckland
- 2016 First place, **Student Paper Award**, Operations Research Society New Zealand
- 2014-16 **Dean's List** (top 5% of cohort), Faculty of Engineering, University of Auckland
- 2013 **Outstanding Scholar** (top 50 high-school students in New Zealand), NZQA

Journal Papers

- J13. *A Stochastic Benders Decomposition Scheme for Large-Scale Stochastic Network Design*
D. Bertsimas, R. Cory-Wright, J. Pauphilet and P. Petridis, minor revision at **INFORMS Journal on Computing**.
- J12. *Evolving Scientific Discovery by Unifying Data and Background Knowledge with AI Hilbert*
R. Cory-Wright, C. Cornelio, S. Dash, B. El Khadir, and L. Horesh, **Nature Communications** 15:5922, 2024.

- IBM Outstanding Technical Accomplishment Award (2024)
- J11. *Decarbonizing OCP*
D. Bertsimas, R. Cory-Wright and V. Digalakis Jr., **Manufacturing & Service Operations Management**, 2024.
- Finalist, M&SOM practice-based research competition (2023)
 - Honorable mention, MIT Operations Research Center Student Paper Award (Digalakis, 2023)
- J10. *Sparse Plus Low-Rank Matrix Decomposition: A Discrete Optimization Approach*
D. Bertsimas, R. Cory-Wright and N. A. G. Johnson, **Journal of Machine Learning Research**, 24(267):1–51, 2023.
- First place, INFORMS Data Mining Society Student Paper Award (2021)
- J9. *A New Perspective on Low-Rank Optimization*
D. Bertsimas, R. Cory-Wright and J. Pauphilet, **Mathematical Programming**, 202(1-2):47–92, 2023.
- J8. *Mixed-Projection Conic Optimization: A New Paradigm for Modeling Rank Constraints*
D. Bertsimas, R. Cory-Wright and J. Pauphilet, **Operations Research**, 70(6):3321–3344, 2022.
- First place, INFORMS George Nicholson Student Paper Award (2020)
- J7. *A Scalable Algorithm for Sparse Portfolio Selection*
D. Bertsimas and R. Cory-Wright, **INFORMS Journal on Computing**, 34(3):1489–1511, 2022.
- J6. *Solving Large-Scale Sparse PCA to Certifiable (Near) Optimality*
D. Bertsimas, R. Cory-Wright and J. Pauphilet, **Journal of Machine Learning Research**, 23(13):1–35, 2022.
- J5. *A Unified Approach to Mixed-Integer Optimization Problems With Logical Constraints*
D. Bertsimas, R. Cory-Wright and J. Pauphilet, **SIAM Journal on Optimization**, 31(3):2340–2367, 2021.
- First place, INFORMS Computing Society Student Paper Award (2019)
 - Abridged eight-page version in 2020 INFORMS Computing Society Newsletter [link]
- J4. *From Predictions to Prescriptions: A Data-Driven Response to COVID-19*
D. Bertsimas, L. Bouissoux, R. Cory-Wright et al., **Health Care Management Science**, 24:253–272, 2021.
- First place, INFORMS Healthcare Applications Society William Pierskalla Paper Award (2020).
- J3. *On Stochastic Auctions in Risk-Averse Electricity Markets With Uncertain Supply*
R. Cory-Wright and G. Zakeri, **Operations Research Letters**, 48(3):376–384, 2020.
- J2. *On Polyhedral and Second-Order Cone Decompositions of Semidefinite Optimization Problems*
D. Bertsimas and R. Cory-Wright, **Operations Research Letters**, 48(1):78–85, 2020.
- J1. *Payment Mechanisms for Electricity Markets With Uncertain Supply*
R. Cory-Wright, A. Philpott and G. Zakeri, **Operations Research Letters**, 46(1):116–121, 2018.
- First place, Operations Research Society of New Zealand Student Paper Award (2016)
 - Preliminary version “Cost-recovering, revenue-adequate single settlement schemes for electricity markets” in Proc. 2016 Joint NZSA and ORSNZ conference.

Working Papers

- W3. *Stability-Adjusted Cross-Validation for Sparse Linear Regression*
R. Cory-Wright and A. Gómez, in preparation, early draft available at arXiv 2306.14851.
- W2. *Optimal Low-Rank Matrix Completion: Semidefinite Relaxations and Eigenvector Disjunctions*
D. Bertsimas, R. Cory-Wright, S. Lo and J. Pauphilet, submitted.
- W1. *Sparse PCA With Multiple Components*
R. Cory-Wright and J. Pauphilet, major revision at **Operations Research**.

Articles in Preparation

- P6. *Abductive Reasoning in Scientific Discovery via Polynomial Optimization*
K. Srivastava, S. Dash, R. Cory-Wright and L. Horesh, in progress.
- P5. *Improving on Representative Days in Renewable Energy Systems*
D. Keenan, R. Cory-Wright and A. Philpott, in progress.
- P4. *Thinking Coherently About Interpretability*
R. Cory-Wright and A. Jacquillat, in progress.

- P3. *Semidefinite Programming Relaxation for Copositive Dual Pricing*
C. Guo, S. Kelly, L. Henderson, B. Yang, and R. Cory-Wright, in progress.
- P2. *A Matrix Generalization of the Goemans-Williamson Algorithm With Application to Orthogonality Constraints*
R. Cory-Wright and J. Pauphilet, in progress.
- P1. *A Scalable Approximation Algorithm for Robust and Distributionally Robust Optimization*
L. Meng, R. Cory-Wright, and W. Wiesemann, in progress.

Books in Preparation

Integer and Matrix Optimization: A Nonlinear Approach
D. Bertsimas, R. Cory-Wright, and J. Pauphilet, Dynamic Ideas Press.

Teaching at Imperial

- Introduction to Machine Learning in Python (MSc AI Applications and Innovation) *Imperial-X*
INSTRUCTOR *Fall 2024*
Designed a new MSc class that introduces students to machine learning and Python.
- Decision Making Under Uncertainty (PhD) *Imperial Business School*
INSTRUCTOR *Spring 2024, 2025*
Designed a new PhD class introducing stochastic optimization, robust optimization, and dynamic programming.
Spring 2024 evaluation: **4.7/5** (overall), **4.6/5** (instructor), **4.7/5** (content). Syllabus available [here]
- Data Structures and Algorithms (undergraduate) *Imperial Business School*
INSTRUCTOR *Spring 2024, 2025*
Designed a new class that introduces computational problem-solving via algorithms and data structures in Python.
Spring 2024 evaluation: **4.4/5** (overall), **4.2/5** (instructor), **4.3/5** (content).
- Optimisation and Decision Models (online MSc business analytics) *Imperial Business School*
INSTRUCTOR *Spring 2024*
Online class that introduces students to theory and applications of linear, discrete, and nonlinear optimization.
Spring 2024 evaluations: **4.2/5** (overall), **4.3/5** (instructor), **4.5/5** (content).

Teaching at MIT

- 15.095 Machine Learning Under a Modern Optimization Lens (MBA/PhD) *MIT*
HEAD TEACHING ASSISTANT *Fall 2019, 2021*
Course which provides a modern treatment of machine learning using convex, robust, and integer optimization.
- 15.071 The Analytics Edge (MBA) *MIT*
HEAD TEACHING ASSISTANT *Fall 2020*
Course which examines real-world examples of how analytics have been used to transform a business or industry.
- 15.093 Optimization Methods (MSc/PhD) *MIT*
TEACHING ASSISTANT *Fall 2018*
Course which provides students with an overview of the main algorithms and applications of optimization.
- Kaufman Teaching Certificate Program *MIT Teaching and Learning Lab*
PARTICIPANT, eight practice-based workshops on teaching effectiveness *Fall 2021*
- 15.S60 Computing in Optimization and Statistics (PhD) *MIT*
INSTRUCTOR *Jan 2019, Jan 2020*
Course which provides an overview of software tools used in optimization, including Julia and JuMP.

Student Advising

DOCTORAL STUDENTS

1. Lingjun Meng, *First year MRes/PhD student at Imperial Business School* (co-advised with Wolfram Wiesemann, research on optimization under uncertainty).

STUDENT CO-AUTHORS

1. Dominic Keehan, *Third year PhD student at University of Auckland* (advised by Andy Philpott, Andrew Mason).
 - Visiting Imperial Business School July-September 2024.
2. Nicholas Johnson, *Fourth year PhD student at MIT ORC* (advised by Dimitris Bertsimas).
 - Coauthored paper awarded 1st place, 2021 INFORMS Data Mining Student Paper Award.
3. Periklis Petridis, *Third year PhD student at MIT ORC* (advised by Dimitris Bertsimas).
4. Vassilis Digalakis Jr., *PhD ('23) at MIT ORC* (advised by Dimitris Bertsimas).
 - Initial placement: Assistant Professor of Operations Management, HEC Paris.
 - Co-authored job market paper, awarded finalist in 2023 M&SOM practice-based research competition and honorable mention in 2023 MIT ORC student paper competition.
5. Sean Lo, *MBA ('22) at MIT Sloan* (advised by Dimitris Bertsimas).
 - Initial placement: MIT ORC doctoral program, advised by Alexandre Jacquillat.

Invited Oral Presentations

INVITED PRESENTATIONS AT ACADEMIC INSTITUTIONS

Title TBD

- IBM TJ Watson Research Center *November 2024*

Evolving Scientific Discovery by Unifying Data and Background Knowledge with AI Hilbert

- Imperial College London Artificial Intelligence Initiative *November 2024*

Optimal Low-Rank Matrix Completion: Semidefinite Relaxations and Eigenvector Disjunctions

- Imperial-X AI Seminar Series *November 2024*
- Toronto Rotman Young Scholar's Seminar Series *November 2023*
- Imperial College London Control and Optimization *November 2023*

A New Perspective on Low-Rank Optimization

- Lehigh Industrial and Systems Engineering *November 2022*

Mixed-Projection Conic Optimization: A New Paradigm for Modeling Rank Constraints

- Imperial College London AI Cutting Edge Overviews and Tutorials *August 2024*
- IBM Thomas J Watson Research Center *August 2022*
- Rice Computational Applied Mathematics and Operations Research *January 2022*
- CMU Tepper Operations Research *January 2022*
- USC Viterbi Industrial and Systems Engineering *January 2022*

- Georgia Tech Industrial and Systems Engineering January 2022
- Johns Hopkins Carey Operations Management January 2022
- Princeton Operations Research and Financial Engineering January 2022
- Imperial College London Analytics and Operations October 2021
- University of Auckland Engineering Science October 2020

INVITED PRESENTATIONS AT SINGLE-TRACK WORKSHOPS

Evolving Scientific Discovery by Unifying Data and Background Knowledge with AI Hilbert

- Summer Workshop on Innovations in Management Science July 2024

Optimal Low-Rank Matrix Completion: Semidefinite Relaxations and Eigenvector Disjunctions

- Mixed Integer Programming Workshop May 2023

CONFERENCE PRESENTATIONS AND GUEST LECTURES

Evolving Scientific Discovery by Unifying Data and Background Knowledge with AI Hilbert

- INFORMS Optimization Society March 2024

Optimal Low-Rank Matrix Completion: Semidefinite Relaxations and Eigenvector Disjunctions

- International Symposium on Mathematical Programming July 2024
- INFORMS Annual Meeting October 2023
- SIAM Conference on Optimization June 2023

Decarbonizing OCP

- M&SOM Practice-Based Research Competition Finalists June 2023
- M&SOM Africa Session June 2023

Sparse PCA With Multiple Components

- INFORMS Annual Meeting October 2022

A New Perspective on Low-Rank Optimization

- ICCOPT July 2022
- INFORMS Optimization Society March 2022
- INFORMS Annual Meeting October 2021

Mixed-Projection Conic Optimization: A New Paradigm for Modeling Low-Rank Constraints

- Mixed Integer Programming Workshop (Poster) May 2021
- INFORMS Annual Meeting Nicholson Finalists November 2020

Solving Large-Scale Sparse PCA To Certifiable (Near) Optimality

- MIT 15.095 Machine Learning Under a Modern Optimization Lens Guest Lecture November 2021
- Mixed Integer Programming Workshop (Poster) May 2020
- INFORMS Optimization Society Conference (cancelled, COVID-19) March 2020

A Unified Approach to Mixed-Integer Optimization Problems With Logical Constraints

- INFORMS Annual Meeting October 2019
- ICCOPT August 2019

A Scalable Algorithm for Sparse Portfolio Selection

- Mixed Integer Programming Workshop (Poster) May 2019
- INFORMS Annual Meeting November 2018

Payment Mechanisms and Risk-Aversion in Electricity Markets With Uncertain Supply

- International Symposium on Mathematical Programming July 2018
- ORSNZ Young Practitioner's Prize Finalists Session December 2016

Other Academic and Industry Experience

OCP Group and MIT Operations Research Center Cambridge, MA
 RESEARCH ASSISTANT Jul. 2021-May 22

University of Auckland, Department of Engineering Science Auckland, New Zealand
 RESEARCH ASSISTANT Dec. 2016-Jul. 17

SUEZ Smart Solutions Auckland, New Zealand
 ASSISTANT OPTIMIZATION ENGINEER Dec. 2014-Feb. 2016

Activities and Service

ORGANIZING SEMINARS AND WORKSHOPS

- 2024- Various 2019 Co-initiator and co-organizer, London Operations Research Day (LORD) [web link],
 Session chair, INFORMS Annual Meeting, ICCOPT, IOS, SIOPT, other conferences
 Co-initiator and co-coordinator, MIT ORC student seminar series

EXTERNAL

- 2024 Judge, M&SOM Student Paper Competition,
- 2017- Member, INFORMS (Main, Computing Society, Optimization Society)
 Member, Mathematical Optimization Society

IMPERIAL

- 2024-25 Thesis committee member, Aras Selvi
- 2024- Program co-lead, Imperial-X executive education,
- 2024 PhD early stage assessment committee, Zhongze Cai, Yanwei Sun

MIT

- 2020 MIT MBAn capstone project matching, Wrote software to allocate 60 masters
 students to industry projects, accounting for student preferences
- 2019 MIT ORC qualifying exam, tester and proctor

PEER REVIEW

Reviewer for academic journals: *Operations Research (OR)*, *Management Science (MS)*, *Manufacturing and Service Operations Management (M&SOM)*, *Mathematical Programming (MAPR)*, *Journal of Machine Learning Research (JMLR)*, *Mathematics of Operations Research (MOOR)*, *Integer Programming and Combinatorial Optimization (IPCO)*, *Foundations of Computational Mathematics (FOCM)*, *INFORMS Journal On Computing (IJOC)*, *INFORMS Journal on Optimization (IJO)*, *SIAM Journal on Optimization (SIOPT)*, *Transportation Science (TS)*, *SIAM Journal on Matrix Analysis and Applications (SIMAX)*, *SIAM Journal on Mathematics of Data Science (SIMODS)*, *Operations Research Letters (ORL)*, *European Journal of Operational Research (EJOR)*, etc.

- 2024 Meritorious Reviewer Award, INFORMS Journal on Computing.