

# Ryan Cory-Wright

PHD CANDIDATE · OPERATIONS RESEARCH CENTER-MIT

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## Education

Massachusetts Institute of Technology

Cambridge, MA

PHD IN OPERATIONS RESEARCH

June 2022

Advisor: Dimitris Bertsimas | Thesis: Integer and Matrix Optimization: A Nonlinear Approach | GPA: 5.0/5.0

University of Auckland

Auckland, New Zealand

BE (1ST CLASS HONORS) IN ENGINEERING SCIENCE

May 2017

Advisors: Golbon Zakeri, Andy Philpott | Thesis: Pricing Wind Under Uncertainty

## Research Interests

Methodological: Analytics, Optimization, Machine Learning, Statistics. Applications: Energy, Finance, Healthcare.

## Honors and Awards

- 2021 Finalist, Student Poster Competition, Mixed Integer Programming Workshop
- 2020 First place, George Nicholson Student Paper Competition, INFORMS  
First place, William Pierskalla Paper Award, INFORMS Health Applications Society  
Finalist, Student Poster Competition, Mixed Integer Programming Workshop
- 2019 First place, ICS Student Paper Award, INFORMS Computing Society
- 2017 Senior Scholar Award (top of graduating class), University of Auckland
- 2016 First place, Young Practitioner's Prize, Operations Research Society New Zealand
- 2014-16 Deans List (top 5% of cohort), Faculty of Engineering, University of Auckland
- 2013 Outstanding Scholar (top 50 high-school students in New Zealand), NZQA

## Publications

*Solving Large-Scale Sparse PCA to Certifiable (Near) Optimality*

with Dimitris Bertsimas, Jean Pauphilet, JMLR, Conditionally Accepted, 2021.

*A Scalable Algorithm for Sparse Portfolio Selection*

with Dimitris Bertsimas, INFORMS Journal on Computing, Accepted, 2021.

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

with Dimitris Bertsimas, Jean Pauphilet, Operations Research, Accepted, 2021.

- First place, INFORMS George Nicholson Student Paper Competition (2020).
- Finalist, MIP Workshop student poster competition (2021).

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

with Dimitris Bertsimas, Jean Pauphilet, SIAM Journal on Optimization, Accepted, 2021.

- First place, INFORMS Computing Society Student Paper Competition (2019).
- Finalist, MIP Workshop student poster competition (2020).

*From Predictions to Prescriptions: A Data-Driven Response to COVID-19*

with Dimitris Bertsimas et al., Health Care Management Science, 2021.

- First place, INFORMS Healthcare Applications Society William Pierskalla Best Paper Award (2020).

- On Stochastic Auctions in Risk-Averse Electricity Markets With Uncertain Supply*  
with Golbon Zakeri, Operations Research Letters, 48(3):376-384, 2020.
- On Polyhedral and Second-Order Cone Decompositions of Semidefinite Optimization Problems*  
with Dimitris Bertsimas, Operations Research Letters. 48(1):78-85, 2020.
- Payment Mechanisms for Electricity Markets With Uncertain Supply*  
with Andy Philpott and Golbon Zakeri, Operations Research Letters. 46(1):116-121, 2018.
- First place, Operations Research Society of New Zealand Young Practitioner's Prize (2016).

## Articles Under Review

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- A New Perspective on Low-Rank Optimization*  
with Dimitris Bertsimas, Jean Pauphilet, under review at Mathematical Programming.

## Articles in Preparation

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- Sparse And Low-Rank Matrix Decomposition: A Discrete Optimization Approach*  
with Dimitris Bertsimas and Nicholas Johnson, targeted at JMLR (target submission date: August 2021).
- Optimizing Solar Panel Capacity Expansion for a Large Industrial Consumer*  
with Dimitris Bertsimas and Kailyn Bryk, targeted at MSOM (target submission date: January 2022).

## Books in Preparation

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- Integer and Matrix Optimization: A Nonlinear Approach*  
with Dimitris Bertsimas and Jean Pauphilet, Dynamic Ideas Press, targeted to appear in 2023.

## Research Experience

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- COVID Analytics: Core Team Member** Cambridge, MA  
**PRINCIPAL INVESTIGATOR: DIMITRIS BERTSIMAS** 2020
- Lead effort to extract features from COVID-related clinical research papers early in the pandemic, which allowed us to more accurately tune parameters in machine learning tools developed to combat the pandemic.
  - Core team awarded the 2020 William Pierskalla INFORMS Health Applications Society paper award for our efforts.
  - Material from the effort available at: covidanalytics.io
- Operations Research Center-MIT: Research Assistant** Cambridge, MA  
**SUPERVISOR: DIMITRIS BERTSIMAS** 2017 - Present
- Developed techniques for solving central problems in OR/ML, with focus on certifiable optimality, scalability.
  - Made methodological and algorithmic contributions to the fields of discrete and conic optimization, including developing new algorithms for solving cardinality and rank constrained problems to certifiable optimality.
- University of Auckland- Dept of Engineering Science: Research Assistant** Auckland, New Zealand  
**SUPERVISOR: GOLBON ZAKERI** 2016-2017
- Designed techniques for pricing electricity with uncertain supply, risk-aversion.
  - Implemented pricing mechanism on a full-scale replica of the New Zealand Market.

## Teaching Experience

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### Kaufman Teaching Certificate Program

MIT Teaching and Learning Lab

#### PARTICIPANT

Fall 2021

- Participant in an intensive semester long workshop series on teaching best practices.
- Topics include: designing a course, preparing a lesson plan, assessing and providing feedback to students, creating an effective and welcoming classroom climate, among others.

### 15.095 Machine Learning Under a Modern Optimization Lens

MIT

#### HEAD TEACHING ASSISTANT

Fall 2019, 2021

- Head TA for a course which provides masters/PhD students with a modern treatment of machine learning using the lenses of convex, robust and mixed-integer optimization.
- Duties: leading recitations, developing/grading assignments/exams, holding office hours, supervising projects.

### 15.071 The Analytics Edge

MIT

#### HEAD TEACHING ASSISTANT

Fall 2020

- Head TA for a class which introduces Sloan MBA students to data analytics. Class held virtually due to COVID-19.
- Duties: preparing/leading recitations, developing/grading assignments, holding office hours, supervising projects.

### 15.S60 Computing in Operations Research and Statistics

MIT

#### SESSION INSTRUCTOR: ADVANCED COMPUTATIONAL OPTIMIZATION

Jan 2019, Jan 2020

- Instructor for 3-hour session which provides PhD students with overview of software tools used in optimization, including the Julia language, the JuMP package for optimization, and distributed computing.

### 15.093 Optimization Methods

MIT

#### TEACHING ASSISTANT

Fall 2018

- TA for course which provides masters students with overview of main algorithms/applications of optimization.
- Duties: leading recitations, developing/grading assignments, answering Piazza questions, holding office hours.

## Mentoring Experience

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### 15.089 Analytics Capstone

MIT

#### PROJECT MENTOR

Summer 2018, Summer 2019

- Advised two projects completed by teams of two Master of Business Analytics (MBAN) students, who applied machine learning techniques to predict/prescribe fund flows for a large investment management company.
- Summer 2018 mentees received award for best capstone presentation in graduating class.

#### OTHER MENTORING

2017-

- Advised an undergraduate research assistant over summer 2021, involving meeting daily.
- Informally mentored several MIT Operations Research Center Masters and PhD students.

## Industry Experience

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### SUEZ Smart Solutions

Auckland, New Zealand

#### ASSISTANT OPTIMIZATION ENGINEER

2014-2016

- Developed and maintained several VBA/SQL tools used by SUEZ engineers in daily operations, including automating a 9-step process for updating historical demand curves which previously took SUEZ around 30 hours/client/year.
- Assisted with installing Aquadapt (SUEZ's pump scheduling optimization software) for two of SUEZ's newest clients.

## Selected Invited Talks

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### High-Dimensional Optimization Over Integers and Matrices.

Presented at: University of Auckland Engineering Science Seminar Series, October 2020.

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

Presented at: INFORMS Nicholson Finalists Session, November 2020; ORC Student Seminar Series, December 2020, MIT LIDS & Stats Tea Talks Series, March 2021, IPCO, May 2021 (poster), MIP Workshop, May 2021 (poster).

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

Presented at: ICCOPT, August 2019; INFORMS, October 2019, MIT ORC Student Seminar Series, November 2019; MIT LIDS Student Conference, January 2020, MIP Workshop, May 2020.

A Scalable Algorithm for Sparse Portfolio Selection.

Presented at: INFORMS Annual Meeting, November 2018; ORC 65th anniversary, November 2018 (poster); LIDS student conference, January 2019; MIP Workshop, June 2019 (poster).

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

Presented at: ORSNZ Young Practitioner's Prize Finalists Session, December 2016, ISMP, July 2018.

## Professional Activities and Service

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2019, 21 INFORMS Annual Meeting, Session Chair

2020 MIT Business Analytics Capstone Project Matching, Wrote software to allocate 60 masters students to industry projects, accounting for student preferences

2019 ORC Student Seminar Series, (Inaugural) Coordinator

2019 MIT ORC Qualifying Exam, Tester and Proctor

2017- Member, INFORMS (Main, Computing Society, Optimization Society)  
Member, Mathematical Optimization Society

## Peer Review

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Referee: European Journal of Operational Research; IEEE Transactions on Power Systems; INFORMS Journal On Computing; INFORMS Journal on Optimization; Journal of Global Optimization; Omega, Operations Research.

## Skills and Activities

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Programming: Julia (preferred), R, VBA, SQL, MATLAB, Mathematica, C++, HTML, CSS.

Software: JuMP (preferred), Gurobi (preferred), MOSEK (preferred), CPLEX (preferred), most languages/solvers.

Languages: English (native), French (conversational), German (beginner).

Citizenship: New Zealand, Ireland.