

# Craig Fernandes

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## Education

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**PhD Operations Research**, University of Toronto

Sep 2021 – May 2025

Advisors: Timothy C.Y. Chan and Ningyuan Chen

**MASc Operations Research**, University of Toronto

Jan 2020 – Aug 2021

Advisor: Timothy C.Y. Chan

cGPA: A+/A+ in all course work

**BASc Industrial Engineering**, University of Toronto

Sep 2014 – May 2018

Ranked 4<sup>th</sup> out of 105 students

## Research Interests

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Optimization, economics, public policy, engineering education, sports analytics

## Working Papers

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8. *Income pools for superstar markets*

Timothy Chan, Ningyuan Chen, Craig Fernandes

In preparation for **Management Science**, 2023.

7. *Aiming for competitive balance: Developing fair handicap systems for darts using a Markov decision process framework*

Rachael Walker, Craig Fernandes

Working paper, 2023

- Finalist, CORS Student Paper Competition (Undergraduate Category), 2023 [Awarded to Rachael]

6. *Equity, diversity, and inclusion in sports analytics*

Craig Fernandes, Jason Vescovi, Richard Norman, Cheri Bradish, Nathan Taback, Timothy Chan

Minor Revision at **Journal of Quantitative Analysis in Sports**, 2022.

## Published Papers

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5. *Case Article – Moneyball for Murderball: Using analytics to construct lineups in wheelchair rugby*

Timothy Chan, Craig Fernandes, Albert Loa, Nathan Sandholtz

**INFORMS Transactions on Education**, forthcoming, 2023.

- First Place, INFORMS Case Competition, 2022

- Media Coverage: [ORMS Today](#)

4. *Advising student-driven analytics projects: A summary of experiences and lessons learned*

Aaron Babier, Craig Fernandes, Ian Zhu

**INFORMS Transactions on Education**, 23(2):121-135, 2023.

- Media Coverage: [ORMS Today](#)

3. *A Markov approach to untangling intention versus execution in tennis*

Timothy Chan, Doug Fearing, Craig Fernandes, Stephanie Kovalchik

**Journal of Quantitative Analysis in Sports**, 18(2): 127-145, 2022.

- Finalist, MIT Sloan Sports Analytics Conference Poster Competition, 2022

2. *Points gained in football: Using Markov process-based value functions to assess team performance*

Timothy Chan, Craig Fernandes, Martin Puterman

**Operations Research**, 69(3): 877-894, 2021.

- Second place, CORS Student Paper Competition (Undergraduate Category), 2018

1. *Predicting plays in the National Football League*

Craig Fernandes, Ronen Yakubov, Yuze Li, Amrit Prasad, Timothy Chan

**Journal of Sports Analytics**, 6(1): 35-43, 2020.

## Conferences

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### Income Pools for Superstar Markets

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| - INFORMS RMP Conference, London (Oral)          | 2023 |
| - MSOM Conference, Montreal (Oral)               | 2023 |
| - INFORMS Annual Conference, Indianapolis (Oral) | 2022 |
| - CORS / INFORMS International, Vancouver (Oral) | 2022 |

### A Markov approach to untangling intention versus execution in tennis

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|--|------|
| - MIT Sloan Sports Analytics Conference, Boston (Poster)       | 2022 |
| - New England Symposium on Statistics in Sports, Boston (Oral) | 2021 |
| - U of T Engineering Research Conference, Virtual (Poster)     | 2021 |
| - CORS Annual Conference, Virtual (Oral)                       | 2021 |
| - Sport Innovation Summit, Virtual (Poster)                    | 2020 |

### Points gained in football: Using Markov process-based value functions to assess team performance

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|--|------|
| - U of T Engineering Research Conference, Virtual (Poster) | 2020 |
| - Sport Innovation Summit, Virtual (Oral)                  | 2019 |
| - CORS Annual Conference, Virtual (Oral)                   | 2018 |

### Predicting plays in the National Football League

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|--|------|
| - U of T Engineering Research Conference, Virtual (Poster)     | 2020 |
| - Sport Innovation Summit, Virtual (Oral)                      | 2019 |
| - New England Symposium on Statistics in Sports, Boston (Oral) | 2017 |

## Teaching Experience

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### MIE263: Stochastic Operations Research

Teaching Assistant, Rating 4.62/5

Winter 2023

### MIE368: Analytics in Action

Teaching Assistant, Rating 4.79/5

Fall 2022

Teaching Assistant, Rating 4.96/5

Fall 2021

Teaching Assistant, Rating 4.84/5

Fall 2020

- MIE Teaching Assistant Award, 2022
- MIE Group Teaching Assistant Award, 2020

## Research Mentorship

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*Developing fair handicap systems for darts using a Markov decision process framework*

2023

R. Walker, **undergraduate thesis**

*Defining Soccer Playing Styles through a Data-Driven Approach*

2021

M. Arif, **undergraduate thesis** (co-advised with Binghao Zhang)

*Drafting for the Columbus Blue Jackets*

2021

D. Nalbantoglu, K. Smith, Y. Pan, **engineering capstone project** (co-advised with Timothy Chan)

*Points Gained in Curling: Modelling Curling as a Markov Reward Process*

2020

J. Tin, **undergraduate thesis** (co-advised with Timothy Chan)

*Optimizing Lineup Selection Dynamically in Wheelchair Rugby*

2020

A. Loa, **undergraduate thesis** (co-advised with Timothy Chan)

## Professional Experience

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**Amazon.com**, Data Scientist I

Summer 2021

- Formulated a gradient boosting classifier on AWS SageMaker to identify low performing promotions with an accuracy of 84%, resulting in an annual savings of \$25.6 million
- Presented results to senior leadership, garnering >\$100K of funding
- Established a cross-functional implementation and maintenance plan to productionalize the ML model, which is currently still deployed

**PepsiCo**, Process Improvement Engineering Intern

Fall 2019 | Summer 2017

- Managed a team of three junior interns to drive process improvement initiatives across the plant
- Utilized lean manufacturing methodologies to optimize the production on three major machines, resulting in annual savings of 101 hours of downtime and \$73,000
- Created a comprehensive database and dashboard for the Toronto and Moncton facilities to pinpoint the optimal allocation of maintenance resources and presented the results to senior leadership

## Applied Research Projects

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### Redeploy.ca, Co-Founder & Consultant

2020

- Developed a full stack software tool to optimize hospital staffing during the COVID-19 pandemic, speeding up the process by 400%
- Built the staffing algorithm using mathematical optimization and created a web application which received positive user feedback
- Collaborated with and advised 20+ hospitals worldwide, including University Health Network and was featured in several news articles

## Service

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### Session Chair

CORS / INFORMS International (Sports Analytics)

2022

## Honors and Awards

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U of T MIE TA Teaching Excellence Award (\$500)	2023
NSERC Vanier CGS (\$150,000)	2023-2025
NSERC CGS D [Declined] (\$105,000)	2023-2025
Wallberg Research Fellowship (\$7,500)	2022
First Place, INFORMS Case Competition (\$500)	2022
U of T SGS Conference Travel Grant (\$800)	2022
U of T MIE Conference Travel Grant (\$650)	2022
Finalist, MIT Sloan Sports Analytics Conference Poster Competition	2022
Ontario Graduate Scholarship (\$15,000)	2021
First place, U of T Engineering Research Conference (\$300)	2021
U of T MIE Group TA Teaching Excellence Award (\$300)	2021
NSERC Canada Graduate Scholarship Master's (\$17,500)	2020
Second place, U of T Engineering Research Conference (\$300)	2020
Second place, CORS Undergraduate Student Paper Competition (\$200)	2018
U of T CSA Group Award (\$5,000)	2017
U of T President's Entrance Scholarship (\$5,000)	2014