

# Craig Fernandes

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## Education

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**PhD Operations Research**, University of Toronto Sep 2021 – Aug 2026  
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 Visits

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**Dartmouth College**, Tuck School of Business Summer 2024  
Hosts: James Siderius and Raghav Singal

## Research Interests

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

## Working Papers

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

Timothy Chan, Craig Fernandes, Rachael Walker

*Working paper*, 2024

- First Place, MIT Sloan Sports Analytics Conference (Oral), 2024
- Finalist, CORS Student Paper Competition (Undergraduate Category), 2023 [Awarded to Rachael]

## Published Papers

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7. *Income pools for superstar markets*

Timothy Chan, Ningyuan Chen, Craig Fernandes

**Management Science**, 2024 (Forthcoming).

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

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

**Journal of Quantitative Analysis in Sports**, 20(2): 87-111, 2024.

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**, 24(2):175-181, 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
- Media Coverage: [INFORMS Analytics Magazine](#)

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.

## Seminars

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Tuck School of Business OM Group (Dartmouth College) 2024

## Conferences

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### Peer Review Market Design

- INFORMS Annual Conference, Seattle (Oral) 2024

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

- MIT Sloan Sports Analytics Conference, Boston (Oral) 2024

### Income Pools for Superstar Markets

- INFORMS Annual Conference, Phoenix (Oral) 2023

- 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**

- MIT Sloan Sports Analytics Conference, Boston (Poster) 2022
- New England Symposium on Statistics in Sports, Boston (Oral) 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**

- 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**

- Sport Innovation Summit, Virtual (Oral) 2019
- New England Symposium on Statistics in Sports, Boston (Oral) 2017

**Teaching Experience**

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**Course Instructor**

MIE368: Analytics in Action Fall 2023

**Teaching Assistant**

MIE263: Stochastic Operations Research, Rated 4.62/5 Winter 2023, 2024, 2025

MIE368: Analytics in Action, Rated 4.86/5 Fall 2020, 2021, 2022

- 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

## 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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| First Place, MIT Sloan Sports Analytics Conference (\$10,000)      | 2024      |
| NSERC CGS MSFSS (\$6,000)  | 2023      |
| Mitacs Globalink Research Award (\$6,000)                          | 2023      |
| TD MDAL Research Grant (\$4,000)                                   | 2023      |
| 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      |
| U of T MIE Group TA Teaching Excellence Award (\$300)              | 2021      |
| NSERC CGS M (\$17,500)   | 2020      |
| Second place, CORS Undergraduate Student Paper Competition (\$200) | 2018      |
| U of T President's Entrance Scholarship (\$5,000)                  | 2014      |