

# Rafid Mahmood

Mechanical and Industrial Engineering  
University of Toronto  
Toronto, Ontario, Canada

Phone: +1 (647) 784 6242  
Email: rafid.mahmood@mail.utoronto.ca  
Homepage: <http://rafidrm.github.io>

## Education

### University of Toronto, Mechanical and Industrial Engineering

**Ph.D Industrial Engineering (Operations Research)** 2015–2020

Advisor: Professor Timothy C. Y. Chan

Vector Institute Postgraduate Affiliate, 2019–2020

Prospective Professors in Training Program, 2019

### University of Toronto, Electrical and Computer Engineering

**M.A.Sc. Electrical Engineering** 2013–2015

Advisor: Professor Ashish Khisti

Thesis: Rank metric convolution codes with applications in network streaming

**B.A.Sc. Electrical Engineering** 2008–2013

Graduated with Honours

## Publications

Articles for Operations Research use alphabetical author ordering. The primary author is starred.

### In Preparation

1. A. Babier, T. C. Y. Chan, A. Diamant, and **R. Mahmood\***, Interior Point Methods with Adversarial Networks, *Target journal Operations Research (Working draft available)*.
2. A. Babier, T. C. Y. Chan, A. Diamant, and **R. Mahmood\***, Markov Chain Monte Carlo Sampling from the Complement of a Polyhedron, *Target journal Operations Research Letters*.

### Under Review

1. A. Babier\*, **R. Mahmood**, A. McNiven, A. Diamant, and T. C. Y. Chan, Knowledge-based Automated Treatment Planning with Three-dimensional Generative Adversarial Networks, *third-round minor review at Medical Physics*, 2018.
2. A. Babier, T. C. Y. Chan, T. Lee, **R. Mahmood\***, and D. Terekhov, A Unified Framework for Model Fitting and Evaluation in Inverse Linear Optimization, *second-round review at Operations Research*, 2019.

*Previously titled Multiple observations and goodness of fit in generalized inverse optimization. Won Honorable Mention at CORS 2018 Best Student Paper Competition: Open Category.*

## Journal Articles

1. **R. Mahmood\***, A. Badr, and A. Khisti, Streaming Codes for Multiplicative-Matrix Channels with Burst Rank Loss, *IEEE Transactions on Information Theory*, 64(7), 5296–5311, 2018.
2. **R. Mahmood\***, A. Badr, and A. Khisti, Convolutional Codes with Maximum Column Sum Rank for Network Streaming, *IEEE Transactions on Information Theory*, 62(6), 3039–3052, 2016.

## Conference Proceedings

1. A. Babier\*, **R. Mahmood\***, A. McNiven, A. Diamant, and T. C. Y. Chan, Automated Treatment Planning in Radiation Therapy with 3-D Generative Adversarial Networks, *NeurIPS Workshop on Machine Learning for Health*, 2018.  
*Workshop version of Knowledge-based automated treatment planning with three-dimensional generative adversarial networks.*
2. **R. Mahmood\***, A. Babier, A. McNiven, A. Diamant, and T. C. Y. Chan, Automated Treatment Planning in Radiation Therapy with Generative Adversarial Networks, *Proceedings of the 3rd Machine Learning for Healthcare Conference*, PMLR 85, 484–499, 2018.  
*Won Runners' Up at CORS 2019 HCOR Student Presentation Competition.*
3. **R. Mahmood\***, A. Badr, and A. Khisti, Low Delay Network Streaming Under Burst Losses, *IEEE International Symposium on Information Theory*, 2898–2902, 2016.
4. **R. Mahmood\***, A. Badr, and A. Khisti, Convolutional Codes with Maximum Column Sum Rank for Network Streaming, *IEEE International Symposium on Information Theory*, 2271–2275, 2015.
5. A. Badr\*, **R. Mahmood**, and A. Khisti, Embedded MDS Codes for Multicast Streaming, *IEEE International Symposium on Information Theory*, 2276–2280, 2015.

## Clinical Abstracts

1. A. Babier\*, **R. Mahmood**, A. McNiven, A. Diamant, and T. C. Y. Chan, The Importance of Evaluating the Complete Knowledge-based Automated Planning Pipeline, *International Conference on the Use of Computers in Radiotherapy*, 2019.
2. A. Babier\*, **R. Mahmood**, A. McNiven, and T. C. Y. Chan, An Optimization Method for Knowledge-based Automated Planning that Leverages Ensemble Dose Predictions, *American Association of Physicists in Medicine*, 2019.
3. A. Babier\*, **R. Mahmood**, A. McNiven, and T. C. Y. Chan, Comparing Deep Learning Architectures for Knowledge-Based Automated Planning, *American Association of Physicists in Medicine*, 2019.

## Presentations

### **Interior Point Methods with Adversarial Networks**

<i>(Scheduled)</i> INFORMS Annual Meeting, Seattle, WA, USA	2019
CORS Annual Conference, Saskatoon, SK, Canada	2019
GERAD Invited Seminar, Université de Montréal, Montréal, QC, Canada	2019

### **A Unified Framework for Model Fitting and Evaluation in Inverse Linear Optimization**

INFORMS Health Care, Boston, MA, USA	2019
CORS Annual Conference, Saskatoon, SK, Canada	2019
CORS Annual Conference, Halifax, NS, Canada	2018
INFORMS Annual Meeting, Houston, TX, USA	2017
CORS Annual Conference, Quebec City, QC, Canada	2017
INFORMS Annual Meeting, Nashville, TN, USA	2016

### **Automated Treatment Planning in Radiation Therapy with Generative Adversarial Networks**

CORS Annual Conference, Saskatoon, SK, Canada	2019
MLHC Conference, Palo Alto, CA, USA	2018

### **Convolutional Codes with Maximum Column Sum Rank for Network Streaming**

IEEE ISIT, Hong Kong, HK, China	2015
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## Teaching Assistantship

<b>MIE 465: Analytics in Action</b>	2017–2019
<i>Responsible for curriculum development in 2017.</i>	
<b>MIE 1620: Linear Programming and Network Flows</b>	2018
<b>MIE 258: Engineering Economics and Accounting</b>	2016–2017
<b>ECE 363: Communication Systems</b>	2015

## Students Supervised

1. Richard Chavez, Sliding Window Generative Adversarial Networks for Radiation Therapy, *Industrial Engineering 4th Year Thesis*, 2019.  
*Co-supervised with Aaron Babier.*
2. Michael Shin, Using Portfolio Theory to Optimize Selection of Daily Fantasy Basketball Contests, *Engineering Science 4th Year Thesis*, 2018.  
*Co-supervised with Ben Potter.*

3. Yusuf Shalaby, Inverse Optimization for Measuring Cancer Treatment Pathway Concordance, *Industrial Engineering 4th Year Thesis*, 2018.  
*Co-supervised with Nasrin Youssefi.*
4. Palmira Pereira, Netflix Prize Problem Using Inverse Optimization, *Masters of Engineering Thesis*, 2017.

## Awards

1. Runners' Up, Health Care Operations Research Student Presentation Competition, CORS Annual Conference, 2019
2. Postgraduate Affiliate Program, Vector Institute, 2019 (\$12 000)
3. Honourable Mention, Student Paper Competition: Open Category, CORS Annual Conference, 2018 (\$100)
4. Postgraduate Doctoral Scholarship, NSERC, 2017 (\$42 000)
5. First Place, Waterfront International Ltd. Quantathon, 2016 (\$7 500)

## Industry Experience

<b>Opus One Solutions</b> , Toronto, ON, Canada	2019
Power Systems Optimization Expert	
<b>NHL Expansion Draft Optimizer</b> ( <a href="http://nhlexpansiondraft.com">http://nhlexpansiondraft.com</a> )	2017
Software Developer	
<b>Microsemi</b> , San Jose, CA, USA	2011–2012
Product Engineer Intern	

## Service

Reviewer for NeurIPS ML4H Workshop 2019 and IEEE ISIT 2017.

## Personal

Languages: English (fluent), French (beginner)

Citizenship: Canadian