

# Raul Astudillo

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## Contact and citizenship information

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Citizenship: Mexico

## Education

2016-Present **Cornell University, USA.**

Ph.D. in Operations Research and Information Engineering

o Expected graduation date: May 2022

o Advisor: Peter I. Frazier

o Minors: Computer Science and Statistics

2011-2016 **University of Guanajuato, Mexico.**

B.S. in Mathematics. GPA: 9.7/10

o Highest GPA of the class 2011-2016

## Research interests

Bayesian Optimization, Preference Learning, Simulation Optimization, Adaptive Experimentation, Optimal Learning

## Publications and working papers

1. R. Astudillo, B. Sha, and P.I. Frazier, "Mixed integer linear programming under preference uncertainty " (A preliminary version of this work was finalist at the 2020 INFORMS Undergraduate Operations Research Prize Competition), *Working paper*.
2. Z. Lin, R. Astudillo, P.I. Frazier, and E. Bakshy, "Efficient preference exploration for multi-objective Bayesian optimization", *Submitted*.
3. R. Astudillo, and P.I. Frazier, "Thinking inside the box: A tutorial on grey-box Bayesian optimization", *Advanced Tutorial at the Winter Simulation Conference, 2021*.
4. R. Astudillo, D.R. Jiang, M. Balandat, P.I. Frazier, and E. Bakshy, "Multi-step budgeted Bayesian optimization with unknown evaluation costs", *Advances in Neural Information Processing Systems, 2021*.
5. R. Astudillo and P.I. Frazier, "Bayesian optimization of function networks", *Advances in Neural Information Processing Systems, 2021*.
6. S. Cakmak, R. Astudillo, P.I. Frazier and E. Zhou, "Bayesian optimization of risk measures", *Advances in Neural Information Processing Systems, 2020*.
7. R. Astudillo and P.I. Frazier, "Multi-attribute Bayesian optimization with interactive preference learning", *International Conference on Artificial Intelligence and Statistics, 2020*.

8. R. Astudillo and P.I. Frazier, "Bayesian Optimization of composite functions", *International Conference on Machine Learning, 2019*.
9. R. Astudillo and P.I. Frazier, "Multi-attribute Bayesian optimization under utility uncertainty", *NIPS Workshop on Bayesian Optimization, 2017*.

## Selected presentations

- Oct 2021 "Grey-box Bayesian optimization", *Young Researchers Workshop, Cornell University's School of ORIE, Ithaca, NY*.
- Mar 2021 "Bayesian optimization of function networks", *SIAM Conference on Computational Science and Engineering, Virtual*.
- Feb 2020 "Interactive Bayesian optimization with uncertain preferences", *Facebook Adaptive Experimentation Workshop, New York City, NY*.
- Jul 2019 "Bayesian optimization of composite functions with application to computationally expensive inverse Problems", *Applied Inverse Problems Conference, Grenoble, France*.
- Jun 2019 "Bayesian optimization of composite functions", *International Conference on Machine Learning, Long Beach, CA*.
- May 2019 "Bayesian optimization of composite functions", *2nd Uber Science Symposium, San Francisco, CA*.
- Nov 2018 "A utility uncertainty approach to multi-attribute Bayesian optimization", *INFORMS Annual Meeting, Phoenix, AZ*.
- Dec 2017 "Multi-attribute Bayesian optimization under utility uncertainty", *NIPS Workshop on Bayesian Optimization, Long Beach, CA*. (contributed poster)

## Selected graduate coursework

- Applied Stochastic Processes
- Mathematical Programming
- Bayesian Statistics and Data Analysis
- Numerical Methods for Data Science
- Bayesian Machine Learning
- Statistical Learning Theory
- Advanced Machine Learning
- Optimal Learning

## Industry experience

- Oct 2020 **Facebook, Menlo Park, CA**.
- Mar 2021 Visiting Researcher
  - Developed novel non-myopic Bayesian optimization algorithms for problems with unknown evaluation costs and implemented them on Facebook's adaptive experimentation pipeline
- Jun-Sep 2020 **Facebook, Menlo Park, CA**.  
Intern
  - Developed novel non-myopic Bayesian optimization algorithms for problems with unknown evaluation costs
  - Mentor: Daniel R. Jiang
- Jul-Aug 2019 **ExxonMobil Upstream Research Company, Houston, TX**.  
Intern
  - Developed novel Bayesian optimization algorithms for improving reservoir development planning under geological uncertainty
  - Mentors: Liz Curry and Xiao-Hui Wu

Jun-Aug 2018 **ExxonMobil Upstream Research Company, Houston, TX.**

Intern

- o Developed novel Bayesian optimization algorithms for improving reservoir development planning under geological uncertainty
- o Mentors: Damian Burch and Xiao-Hui Wu

## Teaching experience

**Cornell University, USA.**

Instructor

Summer 2021 Engineering Stochastic Processes Undergraduate

**Cornell University, USA.**

Teaching Assistant

Fall 2018 Statistical Principles Graduate

Spring 2017 Engineering Stochastic Processes Undergraduate

Fall 2016 Basic Probability and Statistics Undergraduate

**Center for Research in Mathematics (CIMAT), Mexico.**

Teaching Assistant

Fall 2015 Measure Theory and Probability Graduate

**University of Guanajuato, Mexico.**

Teaching Assistant

Spring 2015 Complex Analysis Undergraduate

Fall 2014 Elementary Number Theory Undergraduate

## Selected awards

2021 Outstanding Reviewer Award

2015 Second Prize - XXII International Mathematics Competition for University Students (IMC), Blagoevgrad, Bulgaria.

2014 Third Prize - XXII International Mathematics Competition for University Students (IMC), Blagoevgrad, Bulgaria.

2014 *Orgullo UG* Academic Excellence Award - University of Guanajuato.

2012-2016 Academic Excellence Fellowship - Center for Research in Mathematics.

## Computer skills

Development MATLAB, Python, R

Tools Git,  $\LaTeX$ , Microsoft Office

## Languages

English (proficient), Spanish (native)