

# James Patrick Bailey

Blk 17 Pasir Ris Link, Unit 08-39  
Singapore, 518183

james.bailey@sutd.edu.sg

+65-9239-4324  
jamespbailey.com

## Research Interests

---

Online/Machine Learning  
Integer Programming and Combinatorial Optimization  
Game Theory (and Applications to Economics)  
Graph Theory

## Employment

---

Postdoctoral Researcher, Singapore University of Technology and Design September 2017-Present

Department: Engineering Systems and Design  
Supervisor: Dr. Georgios Piliouras  
Primary Research Topic: Online Optimization and Learning

## Education

---

### Georgia Institute of Technology, Atlanta, GA

Ph.D. Algorithms, Combinatorics, and Optimization, August 2012 - December 2017  
Dissertation Topic: Manipulation in Mechanism Design and the Price of Deception  
Advisor: Dr. Craig A. Tovey  
Home Department: Industrial and Systems Engineering  
Minor: Machine Learning  
Supported by NSF Grant 1335301.

### Kansas State University, Manhattan, KS

M.S., Industrial Engineering, August 2011 - May 2012  
Thesis Title: *Octanary Branching Algorithm*  
Advisor: Dr. Todd Easton  
Area of Study: Operations Research

B.S., Mathematics, August 2008 - May 2012  
B.S., Industrial and Manufacturing Systems Engineering, August 2008 - May 2012  
I-Center Scholar for research on the use of integer programs for the fast recovery of fourier compressible functions for compressed sensing.  
McNair Scholar.

## Funding

---

### NSF Grant 1335301 – The Price of Deception

Amount Awarded: \$276,880.00 July 1, 2013 - June 30, 2017  
Provided preliminary research and assisted Craig A. Tovey in writing grant to support my research as a Ph.D. student.

## Publications

---

\* Indicates Student Authors

- [P1] James P. Bailey and Georgios Piliouras. Multiagent Learning in Network Zero-Sum Games is a Hamiltonian System. Accepted to the International Conference on Autonomous Agents and Multiagent Systems (AAMAS). 2019.
- [P2] James P. Bailey and Georgios Piliouras. Multiplicative Weights Update in Zero-Sum Games. In the Proceedings of the 19th ACM Conference on Economics and Computation (EC). 2018.

- [P3] James P. Bailey, and Craig A. Tovey. *The Price of Deception in Facility Location*. In the Proceedings of the *7th International Workshop on Computational Social Choice (COMSOC)*. 2018.
- [P4] James P. Bailey, Craig A. Tovey, \*Tansel Uras, Sven Koenig, and Alex Nash. *Path Planning on Grids: The Effect of Vertex Placement on Path Length*. In *Proceedings of the Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE)*. 2015.
- [P5] James P. Bailey, Mark A. Iwen, and Craig V. Spencer. *On the Design of Deterministic Matrices for Fast Recovery of Fourier Compressible Functions*. *SIAM Journal on Matrix Analysis and Applications*, Vol. 33, No. 1, pages 263-289. 2012.

## Current Submissions

---

- [P6] James P. Bailey and Craig A. Tovey. *The Price of Deception in Voting*. Submitted to *Games and Economic Behavior*.
- [P7] James P. Bailey, \*Sai Ganesh Nagarajan, and Georgios Piliouras. *Anywhere but a Nash Equilibrium: Follow-the-Regularized Leader in Zero-Sum Games (The Stochastic Case)*. Submitted to *Economics and Computation (EC)*.
- [P8] James P. Bailey and Georgios Piliouras. *Fast and Furious Learning in Zero-Sum Games: Vanishing Regret with Non-Vanishing Step Sizes*. Submitted to the *Conference on Learning Theory (COLT)*.
- [P9] James P. Bailey, Alex Nash, Sven Koenig, and Craig A. Tovey. *Path Length Analysis for Grid-Based Path Planning*. Resubmitted to *Journal of Artificial Intelligence Research*.
- [P10] James P. Bailey, Todd Easton, and \*Fabio Vitor. *Octanary Branching Algorithm*. Submitted to *International Journal of Operations Research*.

## Current Projects

---

- [W1] James P. Bailey and Craig A. Tovey. *Conditions for Stability In Strategic Matching*. Draft available on Request.
- [W2] James P. Bailey and Georgios Piliouras. *Divergence from Nash Equilibrium in Regularized Learning*. Will submit to *Mathematics of Operations Research (MOR)*.
- [W3] James P. Bailey, Christos Papadimitriou, and Georgios Piliouras. *Optimal Selection of Learning Rate in Online Learning*.
- [W4] James P. Bailey, \*Gauthier Gidel, and Georgios Piliouras. *Cycles in Discrete Time Online Learning*.
- [W5] James P. Bailey. *The LP Yolk is a Poor Approximation of the Yolk*. Target journal: *Social Choice and Welfare*.
- [W6] James P. Bailey. *The Yolk is Almost Always Unique, A Rejoinder to “On The Uniqueness of the Yolk”*. Target journal: *Social Choice and Welfare*.

## Presentations

---

- [C1] *Learning Dynamics in Games*. *Workshop on Current Issues in Game Theory & Social Dynamics*. Singapore January 11, 2019.
- [C2] *Multiplicative Weights Update in Zero-Sum Games*.
  - *13th Data Mining & Decision Analytics Workshop*. Phoenix, Arizona. November 3, 2018.
  - *INFORMS*. Phoenix, Arizona. November 4-7, 2018.
  - *19th ACM Conference on Economics and Computation (EC)*. Ithaca, New York. June 19-21, 2018.
- [C3] *The Price of Deception in Facility Location*. *7th International Workshop on Computational Social Choice (COMSOC)*. 2018. Troy, New York. June 25-27, 2018.

- [C4] Strategic Stable Marriage.
- *Microsoft Match-Up*. Cambridge, Massachusetts. April 20-21, 2017.
  - *INFORMS*. Nashville, Tennessee. November 13-16, 2016.
  - *The 3rd annual Young Researchers Workshop on Data-Driven Decision Mechanisms*. Cornell University. October 14-16, 2016.
- [C5] The Price of Deception in Elections.
- *The 13th Meeting of the Society for Social Choice and Welfare*. Lund, Sweden. June 28-July 1, 2016.
  - *INFORMS*. Philadelphia, Pennsylvania. November 1-4, 2015.
- [C6] Path Planning on Grids: The Effect of Vertex Placement on Path Length. *The Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE)*. Santa Cruz, CA. October 8-12, 2015.
- [C7] An Intermediate Perfect Graph Theorem. *2011 Annual Ronald E. McNair Heartland Research Conference*. Kansas City, MO. September 23-25, 2011.

## Experience in Education

---

### Instructor of Record

#### Industrial and Systems Engineering, Georgia Institute of Technology

- ISyE 3833 Engineering Optimization Fall 2015, Spring 2016
  - Taught two courses per semester for 25-30 students focusing on linear and integer programming. Specific emphasis included modeling of linear and integer programs, primal algorithms for simplex, sensitivity analysis and the branch and bound algorithm.
- ISyE 2028 Basic Statistical Methods Summer 2017, Summer 2015
  - Developed a lesson plan and taught courses for 62 and 69 students focusing on the approximation of population statistics, hypothesis testing, confidence intervals and simple and multivariate linear regression.
- ISyE 3133 Engineering Optimization Summer 2013
  - Developed a lesson plan and taught a course for 73 students focusing on linear, integer and dynamic programming with a minor emphasis on graph based algorithms and the stable marriage problem. Specific emphasis included modeling of linear and integer programs, primal/dual algorithms for simplex, sensitivity analysis and the branch and bound algorithm.

### Teaching Assistant

#### Industrial and Systems Engineering, Georgia Institute of Technology

- ISyE 6669: Deterministic Optimization Fall 2013
  - Held office hours for 30+ master's students. Reviewed and graded assignments focused on linear and integer programming.
- ISyE 3133: Engineering Optimization Fall 2012, Spring 2013
  - Organized and taught recitation once a week and office hours for a class of 73 and 80 students respectively. Reviewed and graded assignments pertaining to the linear and integer optimization, dynamic programming and graph based algorithms.

#### Industrial and Manufacturing Systems Engineering, Kansas State University

- IMSE 822: Network Flows and Graph Theory Spring 2012
  - Served as the primary contact for students enrolled in the course. Reviewed and graded assignments pertaining to the theoretical sides of network flows and graph theory.
- IMSE 643: Simulation Fall 2011
  - Held office hours and taught students to develop computer programs to model complex stochastic systems using ARENA and use those models to improve the system.

**Math Grader**

May 2009 - December 2011

Graded students in Discrete Math, Real Number Systems, Algebraic Systems, Number Theory, and Foundations of Analysis for the Department of Mathematics at Kansas State University.

**Tutor**

January 2008 - May 2012

Worked privately and for a variety of programs at Kansas State University tutoring students in advanced mathematics, statistics, physics, and programming courses.

**Peer Assistant**

January 2008 - May 2011

Mentored and tutored “at-risk” students through the Kansas State Pilots Program. 58% of the students are first-generation and 51% of the students are multicultural.

**Community Service**

---

Tutored elementary school students with Georgia Tech CCF at local shelter.  
Mentored high school students at a local shelter.