

# Michael J. Bannister

mbannister@fastmail.com

<https://michaeljbannister.com>

<https://github.com/mbannister>

---

## Teaching Interests

In addition to introductory courses in computer science and discrete mathematics, I am interested in teaching courses in: algorithms and data structures, complexity theory, visualization, image processing, computer graphics and game programming. In general, I am open to teaching any undergraduate computer science course, if given advance notice.

---

## Research Interests

I am interested in the design, implementation, and analysis of geometric and graph algorithms. My current research includes algorithms for social network analysis, graph drawing and network visualization, and parameterized algorithms for NP-hard problems.

---

## Education

<b>PhD in Computer Science</b>	<b>University of California, Irvine</b>	2015
Thesis: Lower Bounds and Fixed-Parameter Tractability of Drawing Graphs. Advisor: David Eppstein.		
<b>MS in Computer Science</b>	<b>University of California, Irvine</b>	2012
Emphasis: algorithms and data structures.		
<b>MA in Mathematics</b>	<b>University of California, Los Angeles</b>	2007
Emphasis: abstract algebra and mathematical logic. Jointly earned with BS.		
<b>BS in Mathematics</b>	<b>University of California, Los Angeles</b>	2007
Summa cum laude. Departmental highest honors. Phi Beta Kappa.		

---

## Employment

<b>Assistant Professor</b>	<b>Santa Clara University</b>	9/2016–8/2017
Taught courses in programming and the theory of algorithms. Conducted research in graph drawing and network visualization. Received consistently high teaching evaluations. Served on departmental and university committees. Worked with C++14, Python3, SDL and SFML.		
<b>Visiting Assistant Professor</b>	<b>Pomona College</b>	7/2015–6/2016
Taught courses in data structures, computational photography and discrete mathematics. Received consistently high teaching evaluations. Supervised projects in cryptography, game tree search and visualization. Worked with Java, C, MATLAB, make, ASan, UBSan, Valgrind and OS X.		
<b>Graduate Student</b>	<b>University of California, Irvine</b>	9/2010–6/2015
Served as a Graduate Student Researcher (GSR) and as a Teaching Assistant (TA).		
<b>Graduate Student Instructor</b>	<b>University of California, Irvine</b>	6/2014–9/2014
Taught courses in programming and data structures. Worked with C++11, make, SDL, Valgrind and Linux.		
<b>Adjunct Faculty</b>	<b>Santiago Canyon College</b>	6/2008–5/2010
Developed and taught courses in algebra and trigonometry.		
<b>Adjunct Faculty</b>	<b>Orange Coast College</b>	1/2008–5/2010
Developed and taught courses in algebra, calculus, differential geometry, topology and the theory of computation.		

## Teaching History

---

### Santa Clara University

Theory of Algorithms (Python)	Spring 2017x2
Object Oriented Programming (C++)	Winter 2017
Introduction to Computer Science (C++)	Fall 2016, Winter 2017

### Pomona College

Discrete Mathematics	Spring 2016
Computation and Cognition Lab (Python)	Spring 2016
Data Structures and Advanced Programing (Java and C)	Fall 2015, Spring 2016
Computational Photography (MATLAB)	Fall 2015

### University of California, Irvine

C++ as a Second Language (C++)	Summer 2014
Design and Implementation of Data Structures (C++)	Summer 2014

### University of California, Irvine (Assisted in Teaching)

Computational Geometry	Spring 2014
Design and Analysis of Algorithms	Winter 2014, Fall 2013, Fall 2012
Discrete Mathematics	Summer 2013, Summer 2012
Operating Systems	Spring 2013
Graph Algorithms	Winter 2013
Concepts in Programming Languages (Java, Haskell, C)	Summer 2011

### Orange Coast College

Calculus 2	Spring 2010
College Algebra	Spring 2010
Honors Topology	Spring 2010, Fall 2009
Precalculus	Fall 2009
Calculus 1	Spring 2009
Theory of Computation	Spring 2009, Spring 2008
Honors Differential Geometry	Spring 2009, Fall 2008
Intermediate Algebra	Fall 2008

### Santiago Canyon College

Elementary Algebra	Spring 2010, Spring 2009, Fall 2008x2
College Algebra	Spring 2010, Fall 2009, Spring 2009
Trigonometry	Fall 2009
Precalculus	Summer 2008

## Awards and Recognitions

---

**Best Presentation Award at the 21st International Symposium on Graph Drawing** 2013

Voted the best presentation out of the 43 presentations given.

**SIAM Student Travel Award** 2012–2014

Three times received for travel to the ACM-SIAM Symposium on Discrete Algorithms.

**Dean's Fellowship, University of California, Irvine** 2010

Four-year fellowship for graduate study at the University of California, Irvine.

**Sherwood Prize, Mathematics Department, UCLA** 2007

Highest academic award given to graduating seniors in Mathematics at UCLA.

## Conference Proceedings

---

- C13. **Track layout is hard.** Michael J. Bannister, William E. Devanny, Vida Dujmovi, David Eppstein and David R. Wood. *Proceedings of the 24th International Symposium on Graph Drawing and Network Visualization (GD'16)*, pp. 499–510. Springer-Verlag, 2016. arXiv:1506.09145
- C12. **Confluent orthogonal drawings of syntax diagrams.** Michael J. Bannister, David A. Brown and David Eppstein. *Proceedings of the 23rd International Symposium on Graph Drawing and Network Visualization (GD'15)*, pp. 260–271. Springer-Verlag, 2015. arXiv:1509.00818
- C11. **The Galois complexity of graph drawing.** Michael J. Bannister, William E. Devanny, David Eppstein and Michael T. Goodrich. *Proceedings of the 22nd International Symposium on Graph Drawing (GD'14)*, pp. 149–161. Springer-Verlag, 2014. arXiv:1408.1422
- C10. **Crossing minimization for 1-page and 2-page drawings of graphs with bounded treewidth.** Michael J. Bannister and David Eppstein. *Proceedings of the 22nd International Symposium on Graph Drawing (GD'14)*, pp. 210–221. Springer-Verlag, 2014. arXiv:1408.6321
- C9. **Windows into geometric events.** Michael J. Bannister, William E. Devanny, Michael T. Goodrich, Joseph A. Simons and Lowell Trott. *Proceedings of the 24th Canadian Conference on Computational Geometry (CCCG'14)*, pp. 11–19. CCCG, 2014. arXiv:1409.5452
- C8. **Small superpatterns for dominance drawing.** Michael J. Bannister, William E. Devanny and David Eppstein. *Proceedings of the Meeting on Analytic Algorithmics & Combinatorics (ANALCO'14)*, pp. 92–103. Society for Industrial and Applied Mathematics, 2014. arXiv:1310.3770
- C7. **Superpatterns and universal point sets.** Michael J. Bannister, Zhanpeng Cheng, William E. Devanny and David Eppstein. *Proceedings of the 21st International Symposium on Graph Drawing (GD'13)*, pp. 208–219. Springer-Verlag, 2013. arXiv:1308.0403
- C6. **Fixed parameter tractability of crossing minimization of almost-trees.** Michael J. Bannister, David Eppstein and Joseph A. Simons. *Proceedings of the 21st International Symposium on Graph Drawing (GD'13)*, pp. 340–351. Springer-Verlag, 2013. arXiv:1308.5741
- C5. **Parameterized complexity of 1-planarity.** Michael J. Bannister, Sergio Cabello and David Eppstein. *Proceedings of the Thirteenth Algorithms and Data Structures Symposium (WADS'13)*, pp. 97–108. Springer-Verlag, 2013. arXiv:1304.5591
- C4. **Windows into relational events.** Michael J. Bannister, Christopher DuBois, David Eppstein and Padhraic Smyth. *Proceedings of the 24th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA'13)*, pp. 856–864. Society for Industrial and Applied Mathematics, 2013. arXiv:1209.5791
- C3. **Force-directed graph drawing using social gravity and scaling.** Michael J. Bannister, David Eppstein, Michael T. Goodrich and Lowell Trott. *Proceedings of the 20th International Symposium on Graph Drawing (GD'12)*, pp. 414–425. Springer-Verlag, 2012. arXiv:1209.0748
- C2. **Randomized speedup of the Bellman–Ford algorithm.** Michael J. Bannister and David Eppstein. *Proceedings of the Meeting on Analytic Algorithmics & Combinatorics (ANALCO'12)*, pp. 41–47. Society for Industrial and Applied Mathematics, 2012. arXiv:1111.5414
- C1. **Hardness of approximate compaction for nonplanar orthogonal graph drawings.** Michael J. Bannister and David Eppstein. *Proceedings of the 19th International Symposium on Graph Drawing (GD'11)*, pp. 367–378. Springer-Verlag, 2011. arXiv:1108.4705

## Journal Publications

---

- J3. **The Galois Complexity of Graph Drawing.** Michael J. Bannister, William E. Devanny, David Eppstein and Michael T. Goodrich. *Journal of Graph Algorithms and Applications*, 19(2):619–656, 2015. arXiv:1408.1422
- J2. **Superpatterns and Universal Point Sets.** Michael J. Bannister, Zhanpeng Cheng, William E. Devanny and David Eppstein. *Journal of Graph Algorithms and Applications*, 18(2):177–209, 2014. arXiv:1308.0403
- J1. **Inapproximability of Orthogonal Compaction.** Michael J. Bannister, David Eppstein and Joseph A. Simons. *Journal of Graph Algorithms and Applications*, 16(3):651–673, 2012. arXiv:1108.4705

## Miscellaneous Publications

---

- M4. **ERGMs are hard.** Michael J. Bannister, William E. Devanny and David Eppstein. *Unpublished manuscript*, 2014. arXiv:1412.1787
- M3. **Lower Bounds and Fixed-Parameter Tractability of Drawing Graphs.** Michael J. Bannister. *PhD Thesis, University of California, Irvine*, 2015.
- M2. **Force-directed 3D arc diagrams.** Michael J. Bannister, Michael T. Goodrich and Peter Sampson. *Proceedings of the 22nd International Symposium on Graph Drawing (poster)*, 2014.
- M1. **Windows into relational events.** Michael J. Bannister, Christopher DuBois, David Eppstein and Padhraic Smyth. *NIPS 2012 Workshop: Algorithmic and Statistical Approaches for Large Social Networks (poster)*, 2012.

## Undergraduate Projects Supervised

---

- Applications of graph drawing to graphical debugging with LLDB** Summer 2017  
with Jackson Wheeler.
- Audiovisual content generation and management systems** Spring 2016  
with Ian Welty.
- A homomorphically encrypted gradebook** Fall 2105–Spring 2016  
with Alope Desai and Noah Mulfinger.
- Monte Carlo tree search: a framework for Go AI** Fall 2105–Spring 2016  
with Archer Wheeler.
- Confluent orthogonal drawing of syntax diagrams [C12]** Fall 2014–Spring 2015  
with David Brown.
- Force-directed 3D arc diagrams [M2]** Fall 2013–Spring 2014  
with Peter Sampson.

## Invited Talks

---

- Universal point sets and superpatterns** Spring 2017  
at San Jose State University Math Colloquium.
- Crossing minimization in book embeddings** Fall 2015  
at Southern California Theory Day hosted by the University of Southern California.
- Windows into relational events** Fall 2015  
at Pomona College CS Colloquium.
- Crossing minimization in book embeddings** Winter 2015  
at ICS Prospective Graduate Student Visit Day at the University of California, Irvine.
- Graph drawing and network visualization** Fall 2014  
at ICS Undergraduate Student Council Lecture Series.

## Conferences Attended

---

- International Symposium on Graph Drawing & Network Visualization. 2012–2015
- ACM-SIAM Symposium on Discrete Algorithms. 2012–2015
- Neural Information Processing Systems. 2012
- Quantum Information Processing. 2012

## Refereeing and Reviewing

---

Refereed for *Combinatorica*, *Algorithmica* (x2), *Journal of Graph Algorithms and Applications* and *SIAM Journal on Computing*. Reviewed for *IWOCA 2015* and *SoCG 2017*.

## Committees

---

Computer Science Committee Member at Santa Clara University.	Fall 2016–Present
Education Master Plan STEM Working Group Member at Santa Clara University.	Winter 2017–Present
STEM PLACE Charette Participant at Santa Clara University.	Fall 2016
Theory Group Social Event Coordinator at University of California, Irvine.	Winter 2012–Spring 2015
Grad School Application Info Session Panelist at University of California, Irvine.	Fall 2014