

Michael J. Bannister

Department of Mathematics and Computer Science
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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

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

Employment

Assistant Professor	Santa Clara University	9/2016–Present
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.		
Visiting Assistant Professor	Pomona College	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.		
Graduate Student	University of California, Irvine	9/2010–6/2015
Served as a Graduate Student Researcher (GSR) and as a Teaching Assistant (TA).		
Graduate Student Instructor	University of California, Irvine	6/2014–9/2014
Taught courses in programming and data structures. Worked with C++11, make, SDL, Valgrind and Linux.		
Adjunct Faculty	Santiago Canyon College	6/2008–5/2010
Developed and taught courses in algebra and trigonometry.		
Adjunct Faculty	Orange Coast College	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 Programming (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 Dujmović, 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 21th 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 21th 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 Twenty-Fourth 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