Jeff Erickson

Curriculum Vitæ

Sohaib and Sara Abbasi Professor
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he/him

Research Interests

Algorithms, data structures, and lower bounds; computational and discrete geometry and topology; topological graph theory; combinatorial optimization; applications of geometry, topology, and optimization to computer graphics, robotics, spatial databases, and mesh generation; computer science education

Education

1992–1996 University of California, Berkeley: Ph.D. in Computer Science, July 1996
Advisor: Raimund Seidel

1990–1992 University of California, Irvine: M.S. in Information and Computer Science, June 1992
Advisor: David Eppstein

1983–1987 Rice University: B.A. in Computer Science/Mathematical Sciences (double major), May 1987

Employment

since 1998 Department of Computer Science, University of Illinois Urbana-Champaign

- *since 2020* Sohaib and Sara Abbasi Professor
- *2013–2016* Associate department head
- *since 2010* Professor
- *2004–2010* Associate professor
- *1998–2004* Assistant professor

1996–1998 Postdoctoral research associate, Center for Geometric Computing, Department of Computer Science, Duke University

1992–1996 Graduate student researcher and graduate student instructor, Computer Science Division, University of California, Berkeley

1990–1992 Graduate student researcher and graduate student instructor, Department of Information and Computer Science, University of California, Irvine

1988–1990 Software engineer, Claris Corporation, Santa Clara, CA (MacWrite II, MacWrite Pro, XTND)

1986–1988 Software engineer, StyleWare, Inc., Houston, TX (TopDraw, AppleWorks GS)

1984–1986 Laboratory assistant, Computer Science Department, Rice University

Visiting Positions

Jan–May 2019 Department of Computer Science, Universiteit Utrecht, Netherlands

Oct 2011, Mar 2012 Visiting professor, École Normale Supérieure, Paris, France

Aug 2011–Jun 2012 Institute of Science and Technology, Austria

Mar–Jun 2005 Fachbereich Informatik, Freie Universität Berlin, Germany

Nov 2004–Feb 2005	Computer Science Department, Polytechnic University, Brooklyn, New York
Aug–Nov 2004	Research associate, Laboratoire lorrain de recherche en informatique et ses applications (LORIA), Nancy, France
Aug–Dec 1994	Research assistant, Fachbereich Informatik, Universität des Saarlandes, and (unofficially) Max-Planck-Institut für Informatik, Saarbrücken, Germany

Awards and Honors

National

2001–2006	National Science Foundation CAREER Award (CCR-0093348)
1999–2002	Alfred P. Sloan Research Fellowship
1996–1998	NSF Mathematical Sciences Postdoctoral Research Fellowship (DMS-9627683)
1983–1987	National Merit Scholarship

Department, College, and University

Spring 1999, Fall 2000, Spring 2001, Fall 2001, Fall 2005, Fall 2006, Spring 2007, Spring 2008, Spring 2010, Fall 2010, Spring 2011, Fall 2012, Fall 2013, Fall 2014, Spring 2015*, Fall 2015, Spring 2016, Spring 2017*, Fall 2017, Spring 2018, Fall 2019, Spring 2020, Fall 2020*, Spring 2021, Fall 2021, and Fall 2022*
: List of Teachers Ranked as Excellent by Their Students, University of Illinois Urbana-Champaign (*outstanding rating)

since 2020
: Sohaib and Sara Abbasi Professorship, Department of Computer Science, University of Illinois Urbana-Champaign

2017–2018, 2019–2021
: Education Innovation Fellow, Grainger College of Engineering, University of Illinois Urbana-Champaign

April 2010
: Xerox Award for (Senior) Faculty Research, College of Engineering, University of Illinois Urbana-Champaign

May 2007
: Campus Award for Excellence in Undergraduate Teaching, University of Illinois Urbana-Champaign (one of five awards campus-wide)

April 2006
: Honorable mention, Campus Award for Excellence in Graduate and Professional Teaching, University of Illinois Urbana-Champaign

Fall 2002
: Computer Science Graduate Student Organization 2002–2003 T-shirt design, Computer Science Department, University of Illinois Urbana-Champaign. (See my web page.)

2002–2009
: Willett Faculty Scholar Award, College of Engineering, University of Illinois Urbana-Champaign

April 2001
: C. W. Gear Outstanding Junior Faculty Award, Department of Computer Science, University of Illinois Urbana-Champaign

April 2001
: William L. Everitt Award for Teaching Excellence, Engineering Council, College of Engineering University of Illinois Urbana-Champaign (nominated and selected by students)

1995–1996
: Graduate Assistance in Areas of National Need Fellowship, Computer Science, University of California, Berkeley

1991–1992
: University of California Regents Fellowship

Students' Awards and Honors

2020–2025	Kyle Fox (Ph.D. 2013): National Science Foundation CAREER award
2020–2025	Amir Nayyeri (Ph.D. 2012): National Science Foundation CAREER award
2019–2020	Kyle Fox (Ph.D. 2013): Best Teacher in Computer Science, Erik Jonsson School of Engineering and Computer Science, University of Texas at Dallas
Fall 2019	Patrick Lin (Ph.D. 2021): Outstanding Teaching Assistant award (one of five), Department of Computer Science, University of Illinois Urbana-Champaign
Fall 2019	Yipu Wang (Ph.D. 2020): Outstanding Teaching Assistant award (one of five), Department of Computer Science, University of Illinois Urbana-Champaign
Fall 2019	David Bunde (Ph.D. 2006): William & Marilyn Ingersoll Chair in Computer Science, Knox College
2018–2019	David Bunde (Ph.D. 2006): Faculty Exceptional Achievement Award, Knox College
Fall 2016	Patrick Lin (Ph.D. 2021): Outstanding Teaching Assistant award (one of five), Department of Computer Science, University of Illinois Urbana-Champaign
June 2016	Hsien-Chih Chang (Ph.D. 2018): Best Student Presentation award, SoCG 2016
Spring 2016	Alexander Steiger (M.S. 2016): Outstanding Teaching Assistant award (one of five), Department of Computer Science, University of Illinois Urbana-Champaign
Spring 2013	Kyle Fox (Ph.D. 2013): C. W. Gear Outstanding Graduate Student award, Department of Computer Science, University of Illinois Urbana-Champaign
2011–2016	Erin Wolf Chambers (Ph.D. 2008): National Science Foundation CAREER award
2009–2014	Alper Üngör (Ph.D. 2002): National Science Foundation CAREER award
Spring 2008	Tracy Russell (née Grauman, M.S. 2008): Outstanding Teaching Assistant award (inaugural award, one of 16), Department of Computer Science, University of Illinois Urbana-Champaign
Spring 2003	Alper Üngör (Ph.D. 2002): David J. Kuck Outstanding Ph.D. Thesis Award, Department of Computer Science, University of Illinois Urbana-Champaign

— Research —

Publications

Each paper is listed once, even if it has appeared in multiple versions. Almost all papers can be downloaded from http://jeffe.cs.illinois.edu/pubs/. *Starred coauthors were students at the time of first submission. Unless indicated otherwise, each paper lists all authors in alphabetical order, following standard practice in theoretical computer science. See also my publication profiles at ACM Digital Library, AMiner, DBLP, Google Scholar, ORCID, Scopus, and Web of Science.

Book

[1] *Algorithms*. 1st edition, xiv+454 pages, June 2019. An open-access textbook. ⟨https://archive.org/details/Algorithms-Jeff-Erickson/⟩ or ⟨http://jeffe.cs.illinois.edu/teaching/algorithms⟩ or ⟨http://algorithms.wtf⟩. See related course materials [85].

Invited Refereed Papers

[2] New lower bounds for Hopcroft's problem. *Discrete & Computational Geometry* 16(4):389–418, 1996, special issue of invited papers from the 11th Annual Symposium on Computational Geometry. Extended abstract in *Proceedings of the 11th Annual Symposium on Computational Geometry*, 127–137, 1995.

[3] Raising roofs, crashing cycles, and playing pool: Applications of a data structure for finding pairwise interactions. With David Eppstein. *Discrete & Computational Geometry* 22(4):569–592, 1999, special issue of invited papers from the 14th Annual Symposium on Computational Geometry. Extended abstract in *Proceedings of the 14th Annual Symposium on Computational Geometry*, 58–67, 1998.

[4] Efficient searching with linear constraints. With Pankaj K. Agarwal, Lars Arge, Paolo G. Franciosa, and Jeffrey S. Vitter. *Journal of Computer and System Sciences* 61(2):192–216, 2000, special issue of invited papers from the 17th Annual ACM Symposium on Principles of Database Systems. Extended abstract in *Proceedings of the 17th Annual ACM Symposium on Principles of Database Systems*, 169–178, 1998.

[5] Reconfiguring convex polygons. With Oswin Aichholzer, Erik D. Demaine*, Ferran Hurtado, Mark Overmars, Michael A. Soss*, and Godfried T. Toussaint. *Computational Geometry: Theory and Applications* 20(1–2):85–95, 2001, special issue of invited papers from the 12th Canadian Conference on Computational Geometry. Extended abstract in *Proceedings of the 12th Canadian Conference on Computational Geometry*, 17–20, 2000.

[6] Flipping cubical meshes. With Marshall Bern and David Eppstein. *Engineering with Computers* 18(3): 173–187, 2002, special issue of invited papers from the 10th International Meshing Roundtable. Extended abstract (without my contributions) in *Proceedings of the 10th International Meshing Roundtable*, 19–29, 2001.

[7] Indexing moving points. With Pankaj K. Agarwal and Lars Arge. *Journal of Computer and System Sciences* 66:207–243, 2003, special issue of invited papers from the 19th ACM Symposium on Principles of Database Systems. Extended abstract in *Proceedings of the 19th ACM Symposium on Principles of Database Systems*, 175–186, 2000.

[8] Nice point sets can have nasty Delaunay triangulations. *Discrete & Computational Geometry* 30:109–132, 2003, special issue of invited papers from the 17th Annual Symposium on Computational Geometry. Extended abstract in *Proceedings of the 17th Annual Symposium on Computational Geometry*, 96–105, 2001.

[9] Optimally cutting a surface into a disk. With Sariel Har-Peled. *Discrete & Computational Geometry* 31(1):37–59, 2004, special issue of invited papers from the 18th Annual Symposium on Computational Geometry. Extended abstract in *Proceedings of the 18th Annual Symposium on Computational Geometry*, 244–253, 2002.

[10] Local polyhedra and geometric graphs. *Computational Geometry: Theory and Applications* 31(1–2): 101–125, 2005, special issue of invited papers from the 19th Annual Symposium on Computational Geometry. Extended abstract in *Proceedings of the 19th Annual Symposium on Computational Geometry*, 171–180, 2003.

[11] Separating point sets in polygonal environments. With Erik D. Demaine, Ferran Hurtado, John Iacono, Stefan Langerman, Henk Meijer, Mark Overmars, and Sue Whitesides. *International Journal of Computational Geometry and Applications* 15(4):403–419, 2005, special issue of invited papers from the 20th Annual Symposium on Computational Geometry. Extended abstract in *Proceedings of the 20th Annual Symposium on Computational Geometry*, 10–16, 2004.

[12] An *h*-adaptive spacetime-discontinuous Galerkin method for linearized elastodynamics. With Reza Abedi*, Robert B. Haber, and Shripad Thite*. *Revue Européenne de Mécanique Numérique [European Journal of Computational Mechanics]* 15(6):619–642, 2006. Invited paper for special issue on adaptive analysis.

[13] On the least median square problem. With Sariel Har-Peled and David Mount. *Discrete & Computational Geometry*, 36(4):593–607, 2006, special issue of invited papers from the 20th Annual Symposium on Computational Geometry. Extended abstract in *Proceedings of the 20th Annual Symposium on Computational Geometry*, 273–279, 2004.

[14] Realizing partitions respecting full and partial order information. With Erik D. Demaine, Danny Križanc, Henk Meijer, Pat Morin, Mark Overmars, and Sue Whitesides. *Journal of Discrete Algorithms*

6:51–58, 2008, special issue of invited papers from the 16th Australasian Workshop on Combinatorial Algorithms. Extended abstract in *Proceedings of the 16th Australasian Workshop on Combinatorial Algorithms*, 105–114, 2005.

[15] Splitting (complicated) surfaces is hard. With Erin W. Chambers*, Éric Colin de Verdière, Francis Lazarus, and Kim Whittlesey. *Computational Geometry: Theory and Applications* 41(1–2):94–110, 2008, special issue of invited papers from the 22nd European Workshop on Computational Geometry. Extended abstract in *Proceedings of the 22nd Annual Symposium on Computational Geometry*, 421–429, 2006.

[16] Homotopic Fréchet distance between curves, or walking your dog in the woods in polynomial time. With Erin W. Chambers*, Éric Colin de Verdière, Sylvain Lazard, Francis Lazarus, and Shripad Thite*. *Computational Geometry: Theory and Applications* 43(3):295–311, 2010, special issue of invited papers from the 24th Annual Symposium on Computational Geometry. Extended abstract in *Proceedings of the 24th Annual Symposium on Computational Geometry*, 101–109, 2008.

[17] Finding one tight cycle. With Sergio Cabello, Matt de Vos, and Bojan Mohar. *ACM Transactions on Algorithms* 6(4):article 61, 2010, special issue of invited papers from the 19th Annual ACM-SIAM Symposium on Discrete Algorithms. *Proceedings of the 19th Annual ACM-SIAM Symposium on Discrete Algorithms*, 527–531, 2008.

[18] Homology flows, cohomology cuts. With Erin W. Chambers* and Amir Nayyeri*. *SIAM Journal on Computing* 41(6):1605–1634, 2012, special section of invited papers from the 41st Annual ACM Symposium on Theory of Computing. Extended abstract in *Proceedings of the 41st Annual ACM Symposium on Theory of Computing*, 273–282, 2009.

[19] Combinatorial optimization of cycles and bases. *Advances in Applied and Computational Topology*, Afra Zomorodian, editor. *Proceedings of Symposia in Applied Mathematics* 70, American Mathematical Society, 2012, pp. 195–228. Invited survey for an AMS Short Course at the 2011 Joint Mathematics Meetings.

[20] Tracing compressed curves in triangulated surfaces. With Amir Nayyeri*. *Discrete & Computational Geometry* 49(4):823–863, 2013, special issue of invited papers from the 28th Symposium on Computational Geometry. Extended abstract in *Proceedings of the 28th Symposium on Computational Geometry*, 131–140, 2012.

[21] Efficiently hex-meshing things with topology. *Discrete & Computational Geometry* 52(3):427–449, 2014, special issue of invited papers from the 29th Symposium on Computational Geometry. Extended abstract in *Proceedings of the 29th Annual Symposium on Computational Geometry*, 37–46, 2013.

[22] Recognizing weakly simple polygons. with Hugo Akitaya*, Greg Aloupis, and Csaba Tóth. *Discrete & Computational Geometry* 58(4):785–821, 2017, special issue of invited papers from the 32nd International Symposium on Computational Geometry. arXiv:1603.07401. Extended abstract in *Proceedings of the 32nd International Symposium on Computational Geometry*, 8:1–8:16, 2016.

[23] Untangling planar curves. With Hsien-Chih Chang*. *Discrete & Computational Geometry* 58(4):889–920, 2017, special issue of invited papers from the 32nd International Symposium on Computational Geometry. arXiv:1702.00146. Extended abstract in *Proceedings of the 32nd International Symposium on Computational Geometry*, 29:1–29:16, 2016. Winner of the SoCG 2016 Best Student Presentation Award.

[24] Topologically trivial closed walks in directed surface graphs. With Yipu Wang*. *Discrete & Computational Geometry* 64(4):1253–1294, 2020, special issue of invited papers from the 35th International Symposium on Computational Geometry. *Proceedings of the 35th International Symposium on Computational Geometry*, 34:1–34:17, 2019. arXiv:1812.01564.

[25] A toroidal Maxwell–Cremona–Delaunay correspondence. With Patrick Lin*, *Journal of Computational Geometry* 12(2):55–85, 2021, special issue of invited papers from the 36th International Symposium on Computational Geometry. *Proceedings of the 36th International Symposium on Computational Geometry*, 40:1–40:17, 2020. arXiv:2003.10057.

[26] Smoothing the gap between NP and $\exists\mathbb{R}$. With Ivor van der Hoog* and Tillmann Miltzow. *SIAM Journal on Computing*, special section of invited papers from the 61st Annual IEEE Symposium on Foundations of Computer Science. *Proceedings of the 61st Annual IEEE Symposium on Foundations of Computer Science*, 1022–1033, 2020. arXiv:1912.02278. Preliminary extended abstract (with a different title) in *Abstracts of the 36th European Workshop on Computational Geometry*, 62:1–62:7, 2020.

[27] Fusible numbers and Peano arithmetic. With Gabriel Nivasch and Junyan Xu. *Logical Methods in Computer Science* 18(3:6), 2022, special issue of invited papers from the 36th Annual ACM/IEEE Symposium on Logic in Computer Science. *Proceedings of the 36th Annual ACM/IEEE Symposium on Logic in Computer Science*, 1–13, 2021. Distinguished paper. arXiv:2003.14342.

[28] Chasing puppies: Mobile beacon routing on closed curves. With Mikkel Abrahamsen, Irina Kostitsyna, Maarten Löffler, Tillman Miltzow, Jérôme Urhausen*, Jordi Vermeulen*, and Giovanni Viglietta. To appear in *Journal of Computational Geometry* 13(2), 2002, special issue of invited papers from the 37th International Symposium on Computational Geometry. *Proceedings of the 37th International Symposium on Computational Geometry*, 5:1–5:19, 2021. arXiv:2103.09811.

[29] Planar and toroidal morphing made easier. With Patrick Lin*. To appear in *Journal of Graph Algorithms and Applications*, special issue of invited papers from the 29th International Symposium on Graph Drawing and Network Visualization. *Proceedings of the 29th International Symposium on Graph Drawing and Network Visualization*, 123–137; *Lecture Notes in Computer Science* 12868, Springer, 2021. arXiv:2106.14086.

Other Refereed Journal Papers

[30] Iterated nearest neighbors and finding minimal polytopes. With David Eppstein. *Discrete & Computational Geometry* 11(4):321–350, 1994. Portions also appeared in *Proceedings of the 4th Annual ACM-SIAM Symposium on Discrete Algorithms*, 64–73, 1993.

[31] Better lower bounds on detecting affine and spherical degeneracies. With Raimund Seidel. *Discrete & Computational Geometry* 13(1):41–57, 1995. Erratum in *Discrete & Computational Geometry* 18(2):239–240, 1997. Extended abstract in *Proceedings of the 34th Annual IEEE Symposium on Foundations of Computer Science*, 528–536, 1993.

[32] New lower bounds for convex hull problems in odd dimensions. *SIAM Journal on Computing* 28(4): 1198–1214, 1999. Extended abstract in *Proceedings of the 12th Annual Symposium on Computational Geometry*, 1–9, 1996.

[33] Lower bounds for linear satisfiability problems. *Chicago Journal of Theoretical Computer Science* 1999(6), 1999. Extended abstract in *Proceedings of the 6th Annual ACM-SIAM Symposium on Discrete Algorithms*, 388–395, 1995.

[34] Space-time tradeoffs for emptiness queries. *SIAM Journal on Computing* 29(6):1968–1996, 2000. Extended abstract in *Proceedings of the 13th Annual Symposium on Computational Geometry*, 304–313, 1997. Includes results from [57].

[35] Flipturning polygons. With Oswin Aichholzer, Carmen Cortés*, Vida Dujmović*, Erik D. Demaine, Henk Meijer, Mark Overmars, Belén Palop, Suneeta Ramaswami, and Godfried T. Toussaint. *Discrete & Computational Geometry* 28:231–253, 2002.

[36] Algorithmic issues in modeling motion. With Pankaj K. Agarwal, Leonidas J. Guibas, and 18 others. *ACM Computing Surveys* 34(4):550–572, 2002.

[37] Preprocessing chains for dihedral rotations is hard or even impossible. With Michael A. Soss* and Mark Overmars. *Computational Geometry: Theory and Applications* 26(3):235–246, 2003.

[38] Kinetic collision detection for two simple polygons. With Julien Basch, Leonidas J. Guibas, John Hershberger, and Li Zhang*. *Computational Geometry: Theory and Applications* 27(3):211–235, 2004. Extended abstract in *Proceedings of the 10th Annual ACM-SIAM Symposium on Discrete Algorithms*, 102–111, 1999.

[39] Dense point sets have sparse Delaunay triangulations. *Discrete & Computational Geometry* 33:83–115, 2005. Extended abstract in *Proceedings of the 13th Annual ACM-SIAM Symposium on Discrete Algorithms*, 125–134, 2002.

[40] Output-sensitive algorithms for computing nearest-neighbor decision boundaries. With David Bremner, Erik D. Demaine, John Iacono, Stefan Langerman, Pat Morin, and Godfried Toussaint. *Discrete & Computational Geometry* 33(4):593–604, 2005. Extended abstract in *Proceedings of the 8th International Workshop on Algorithms and Data Structures*, 451–461. *Lecture Notes in Computer Science* 2748, Springer-Verlag, 2003.

[41] Building space-time meshes over arbitrary spatial domains. With Damrong Guoy, John M. Sullivan, and Alper Üngör*. *Engineering with Computers* 20(4):342–353, 2005. Extended abstract in *Proceedings of the 11th International Meshing Roundtable*, 391–402, 2002.

[42] Capturing a convex object with three discs. With Jean Ponce, Fred Rothganger*, and Shripad Thite*. *IEEE Transactions on Robotics* 23(6):1133–1140, 2007. Extended abstract in *Proceedings of the 2003 IEEE International Conference on Robotics and Automation*, 2242–2247, 2003.

[43] Centerpoint theorems for wedges. With Ferran Hurtado and Pat Morin. *Discrete Mathematics and Theoretical Computer Science* 11(1):45–54, 2009.

[44] Vietoris-Rips complexes of planar point sets. With Erin W. Chambers*, Vin de Silva, and Robert Ghrist. *Discrete & Computational Geometry* 44(1):75–90, 2010.

[45] Computing the shortest essential cycle. With Pratik Worah*. *Discrete & Computational Geometry* 44(4):912–930, 2010.

[46] Tightening non-simple paths and cycles on surfaces. With Éric Colin de Verdière. *SIAM Journal on Computing* 39(8):3784–3813, 2010. Extended abstract in *Proceedings of the 17th Annual ACM-SIAM Symposium on Discrete Algorithms*, 192–201, 2006.

[47] Multiple-source shortest paths in surface-embedded graphs. With Sergio Cabello and Erin W. Chambers. *SIAM Journal on Computing* 42(4):1542–1571, 2013. Preliminary version (without my contributions) in *Proceedings of the 18th Annual ACM-SIAM Symposium on Discrete Algorithms*, 89–97, 2007.

[48] Necklaces, convolutions, and $X+Y$. With David Bremner, Timothy M. Chan, Erik D. Demaine, Ferran Hurtado, John Iacono, Stefan Langerman, Mihai Pătraşcu, and Perouz Taslakian*. *Algorithmica* 69(2):294–314, 2014. Extended abstract (without Pătraşcu) in *Proceedings of the 14th Annual European Symposium on Algorithms*, 160–171. *Lecture Notes in Computer Science* 4168, Springer-Verlag, 2006.

[49] Unfolding and dissection of multiple cubes. With Zachary Abel*, Brad Ballinger, Erik D. Demaine, Martin L. Demaine, Adam Hesterberg*, Hiro Ito, Irina Kostitsyna, Jayson Lynch*, and Ryuhei Uehara. *Journal of Information Processing* 25:610–615, 2017, special issue of discrete and computational geometry, graphs, and games. Extended abstract in *Abstracts of the 19th Japan Conference on Discrete and Computational Geometry, Graphs, and Games*, 42–43, 2016.

[50] Minimum cuts in surface graphs. With Erin W. Chambers, Kyle Fox, and Amir Nayyeri. To appear in *SIAM Journal on Computing*. Combined full version of [71], [74], and [77].

Refereed Book Chapters

[51] Sowing games. *Games of No Chance*, Richard J. Nowakowski, editor. *Mathematical Sciences Research Institute Publications* 29, Cambridge University Press, 1996, pp. 287–297.

[52] New Toads and Frogs results. *Games of No Chance*, Richard J. Nowakowski, editor. *Mathematical Sciences Research Institute Publications* 29, Cambridge University Press, 1996, pp. 299–310.

[53] Geometric range searching and its relatives. With Pankaj K. Agarwal. *Advances in Discrete and Computational Geometry*, Bernard Chazelle, Jacob E. Goodman, and Richard Pollack, editors. *Contemporary Mathematics* 223, American Mathematical Society Press, 1999, pp. 1–56.

[54] Arbitrarily large neighborly families of congruent symmetric convex 3-polytopes. With Scott Kim. *Discrete Geometry: In Honor of W. Kuperberg's 60th Birthday*, Andras Bezdek, editor. *Lecture Notes in Pure and Applied Mathematics*, Marcel Dekker, 2003, pp. 267–278.

[55] Vertex-unfoldings of simplicial manifolds. With Erik D. Demaine, David Eppstein, George W. Hart, and Joseph O'Rourke. *Discrete Geometry: In Honor of W. Kuperberg's 60th Birthday*, Andras Bezdek, editor. *Lecture Notes in Pure and Applied Mathematics*, Marcel Dekker, 2003, pp. 215–228. *Proceedings of the 18th Annual Symposium on Computational Geometry*, 237–243, 2002.

Conference Papers with no Journal Version

[56] On the relative complexities of some geometric problems. *Proceedings of the 7th Canadian Conference on Computational Geometry*, 85–90, 1995. Full version available at ⟨http://jeffe.cs.illinois.edu/pubs/relative.html⟩.

[57] New lower bounds for halfspace emptiness. *Proceedings of the 37th Annual IEEE Symposium on Foundations of Computer Science*, 472–481, 1996. Merged into the journal version of [34].

[58] Kinetic binary space partitions for intersecting segments and disjoint triangles. With Pankaj K. Agarwal and Leonidas J. Guibas. *Proceedings of the 9th Annual ACM-SIAM Symposium on Discrete Algorithms*, 107–116, 1998.

[59] Separation-sensitive collision detection for convex objects. With Leonidas J. Guibas, Jorge Stolfi, and Li Zhang*. *Proceedings of the 10th Annual ACM-SIAM Symposium on Discrete Algorithms*, 327–336, 1999.

[60] Finite-resolution hidden surface removal. *Proceedings of the 11th Annual ACM-SIAM Symposium on Discrete Algorithms*, 901-909, 2000.

[61] Flat-state connectivity of linkages under dihedral motions. With Greg Aloupis*, Erik D. Demaine, Vida Dujmović, Stefan Langerman, Henk Meijer, Ileana Streinu, Joseph O'Rourke, Mark Overmars, Michael Soss*, and Godfried Toussaint. *Proceedings of the 13th Annual International Symposium on Algorithms and Computation*, 369–380. *Lecture Notes in Computer Science* 2518, Springer-Verlag, 2002.

[62] On the complexity of halfspace volume queries. With Erik D. Demaine and Stefan Langerman. *Proceedings of the 15th Canadian Conference on Computational Geometry*, 159–160, 2003.

[63] Spacetime meshing with adaptive refinement and coarsening. With Reza Abedi*, Shuo-Heng Chung*, Yong Fan*, Michael Garland, Damrong Guoy, Robert Haber, John Sullivan, Shripad Thite*, and Yuan Zhou*. *Proceedings of the 20th Annual Symposium on Computational Geometry*, 300–309, 2004.

[64] Efficient tradeoff schemes in data structures for querying moving objects. With Pankaj K. Agarwal, Lars Arge, and Hai Yu*. *Proceedings of the 12th Annual European Symposium on Algorithms*, 4–15. *Lecture Notes in Computer Science* 3221, Springer-Verlag, 2004.

[65] Automatic blocking scheme for structured meshing in 2d multiphase flow simulation. With Damrong Guoy. *Proceedings of the 13th Annual International Meshing Roundtable*, 121–132, 2004. ⟨http://imr.sandia.gov/papers/abstracts/Gu318.html⟩

[66] Greedy optimal homotopy and homology generators. With Kim Whittlesey. *Proceedings of the 16th Annual ACM-SIAM Symposium on Discrete Algorithms*, 1038–1046, 2005.

[67] Lower bounds for external algebraic decision trees. *Proceedings of the 16th Annual ACM-SIAM Symposium on Discrete Algorithms*, 755–761, 2005.

[68] Minimum-cost coverage of point sets by disks. With Helmut Alt, Esther M. Arkin, Hervé Brönnimann, Sándor P. Fekete, Christian Knauer, Jonathan Lenchner*, Joseph S. B. Mitchell, and Kim Whittlesey. *Proceedings of the 22nd Annual Symposium on Computational Geometry*, 449–458, 2006.

[69] Empty-ellipse graphs. With Olivier Devillers and Xavier Goaoc. *Proceedings of the 19th Annual ACM-SIAM Symposium on Discrete Algorithms*, 1249–1257, 2008.

[70] Testing contractibility in planar Rips complexes. With Erin W. Chambers* and Pratik Worah*. *Proceedings of the 24th Annual Symposium on Computational Geometry*, 251–259, 2008.

[71] Minimum cuts and shortest homologous cycles. With Erin W. Chambers* and Amir Nayyeri*. *Proceedings of the 25th Annual Symposium on Computational Geometry*, 377–385, 2009. Merged into [50] for journal publication.

[72] Maximum flows and parametric shortest paths in planar graphs. *Proceedings of the 21st Annual ACM-SIAM Symposium on Discrete Algorithms*, 794–804, 2010.

[73] Shortest non-crossing walks in the plane. With Amir Nayyeri*. *Proceedings of the 22nd Annual ACM-SIAM Symposium on Discrete Algorithms*, 297–308, 2011.

[74] Minimum cuts and shortest non-separating cycles via homology covers. With Amir Nayyeri*. *Proceedings of the 22nd Annual ACM-SIAM Symposium on Discrete Algorithms*, 1166–1176, 2011. Merged into [50] for journal publication.

[75] Computing replacement paths in surface embedded graphs. With Amir Nayyeri*. *Proceedings of the 22nd Annual ACM-SIAM Symposium on Discrete Algorithms*, 1347–1354, 2011.

[76] Shortest non-trivial cycles in directed surface graphs. *Proceedings of the 27th Annual Symposium on Computational Geometry*, 236–243, 2011.

[77] Global minimum cuts in surface-embedded graphs. With Kyle Fox* and Amir Nayyeri*. *Proceedings of the 23rd Annual ACM-SIAM Symposium on Discrete Algorithms*, 1309–1318, 2012. Merged into [50] for journal publication.

[78] Transforming curves on surfaces redux. With Kim Whittlesey. *Proceedings of the 24th Annual ACM-SIAM Symposium on Discrete Algorithms*, 1646–1655, 2013.

[79] A near-optimal approximation algorithm for asymmetric TSP on embedded graphs. With Anastasios Sidiropoulos. *Proceedings of the 30th Annual Symposium on Computational Geometry*, 130–135, 2014.

[80] Detecting weakly simple polygons. With Hsien-Chih Chang* and Chao Xu*. *Proceedings of the 26th Annual ACM-SIAM Symposium on Discrete Algorithms*, 1655–1670, 2015. Full version at arXiv:1407.3340.

[81] Tightening curves on surfaces via local moves. With Hsien-Chih Chang*, David Letscher, Arnaud de Mesmay, Saul Schleimer, Stephan Tillmann, Eric Sedgwick, and Dylan Thurston. *Proceedings of the 29th Annual ACM-SIAM Symposium on Discrete Algorithms*, 121–135, 2018.

[82] Holiest minimum-cost paths and flows in surface graphs. With Kyle Fox and Luvsandondov Lkhamsuren*. *Proceedings of the 50th Annual ACM Symposium on Theory of Computing*, 1319–1332, 2018. arXiv:1804.01045.

[83] Lower bounds for electrical reduction on surfaces. With Hsien-Chih Chang* and Marcos Cossarini. *Proceedings of the 35th International Symposium on Computational Geometry*, 25:1–25:16, 2019. arXiv:1707.04683.

[84] How to morph graphs on the torus. With Erin Chambers, Patrick Lin*, and Salman Parsa. *Proceedings of the 32nd Annual ACM-SIAM Symposium on Discrete Algorithms*, 2759–2778, 2021. arXiv:2007.07927.

Course Materials

[85] *Algorithms*. Freely available textbook [1] (xiv+454 pages), related lecture notes (526 pages), and homework/exam/discussion archive (890 pages) for my theoretical computer science classes at Illinois, most recently revised June 2019. ⟨http://jeffe.cs.illinois.edu/teaching/algorithms/⟩ or ⟨http://algorithms.wtf⟩.

Abstracts, Preprints, Presentations, Etc.

[86] Font family numbers. With Rilla Reynolds. Apple II GS Technical Note #41, May 1988. Revised by Matt Deatherage and Keith Rollin, November 1990. ⟨https://archive.org/details/IIgs_2523041_Font_Family_Numbers⟩

[87] DrawPicture data format. With Keith Rollin. Apple II GS Technical Note #46, November 1988. ⟨https://archive.org/details/IIgs_2523046_DrawPicture_Format⟩

[88] New algorithms for minimum measure simplices and one-dimensional weighted Voronoi diagrams. With David Eppstein. Technical Report 92-55, Department of Information and Computer Science, University of California, Irvine, June 1992.

[89] *Lower Bounds for Fundamental Geometric Problems*. Ph.D. dissertation, Computer Science Division, University of California, Berkeley, July 1996.

[90] Plücker coordinates. *Ray Tracing News* 10(3), 1997. ⟨http://www.realtimerendering.com/resources/RTNews/html/rtnv10n3.html⟩.

[91] Finding longest arithmetic progressions. Unpublished manuscript, 1999. ⟨https://jeffe.cs.illinois.edu/pubs/arith.html⟩.

[92] Distance-2 edge coloring is NP-complete. With David P. Bunde* and Shripad Thite*. Unpublished manuscript, 2005. arXiv:cs/0509100.

[93] Guest editor's foreword. *Discrete & Computational Geometry* 42(1):1–2, 2009, special issue of invited papers from the 23rd Annual Symposium on Computational Geometry.

[94] Special section on Foundations of Computer Science [Guest editors' foreword]. With Scott Aaronson, Mohammad Mahdian, R. Ravi, and Emanuele Viola. *SIAM Journal on Computing* 40(3):770, 2011, special section of invited papers from the 49th IEEE Symposium on Foundations of Computer Science (2008).

[95] Global minimum cuts in surface embedded graphs. With Erin W. Chambers, Kyle Fox, and Amir Nayyeri. Invited article in *Encyclopedia of Algorithms*, 2nd edition, Springer, 2016. arXiv:1910.04278. Summarizes results from [71], [74], and [77].

[96] Electrical reduction, homotopy moves, and defect. With Hsien-Chih Chang*. Unpublished manuscript, October 2015. arXiv:1510.00571. Superseded by [23] and [83].

[97] Unwinding annular curves and electrically reducing planar networks. With Hsien-Chih Chang*. *Abstracts of the Computational Geometry: Young Researchers Forum*, 2017. Sketches results from [81] and [83].

[98] Embedded-width: A variant of treewidth for plane graphs. With Glencora Borradaile, Hung Le*, and Robbie Weber*. Preprint, March 2017. arXiv:1703.07532.

[99] Four vertex-disjoint paths in planar graphs. With Yipu Wang*. Preprint, April 2018.

[100] Optimal curve straightening is $\exists\mathbb{R}$-complete. Preprint, August 2019. arXiv:1908.09400.

[101] Orthogonal schematization with minimum area homotopy. With Bram Custers*, Irina Kostitsyna, Wouter Meulemans, Bettina Speckmann, and Kevin Verbeek. *Abstracts of the 36th European Workshop on Computational Geometry*, 64:1–64:7, 2020.

Funding

2022–2023 PrairieLearn for theoretical computer science. With Carl Evans, Yael Gertner, Brad Solomon, and Tiffani Williams. University of Illinois Urbana Champaign, Grainger College of Engineering, Strategic Instructional Innovations Program. [$10,000]

2017–2021 NSF SPX: Collaborative research: Asynchronous, parallel-adaptive solution of extreme multiscale problems in seismology (SPX-1725544). Co-principal investigator. With Reza Abedi (University of Tennessee, co-PI), Robert Haber (PI), Ahmed Elbanna (co-PI), and Volodymyr V. Kindratenko (co-PI). [$800,000]

2014–2018 NSF AF: Medium: Collaborative research: Fast and accurate optimization in planar graphs and beyond (CCF-1408763). Co-principal investigator. With Philip Klein (Brown University, PI). [$1,200,000]

2013–2014 NSF: Student travel support for SoCG 2013 (CCF-1342819). Sole principal investigator. [$20,000]

2009–2014 NSF AF: Small: Optimization in surface-embedded graphs (CCF-0915519). Sole principal investigator. [$500,000]

2009–2012 NSF EAGER: Adaptive spacetime discontinuous Galerkin methods in 3d×time (OCI-0948393). Co-principal investigator. With Robert Haber (PI). [$200,000]

2005–2008 NSF MSPA/MCS: Fundamental geodesic problems in computational topology (DMS-0528086). Principal investigator. With Robert Ghrist (co-PI) and Steve LaValle (co-PI). [$500,000] One of three grants chosen from over 100 proposals.

2002–2005 NSF ITR: Making 3d visibility practical (CCR-0219594). Co-principal investigator. With Frédo Durand (MIT), John Hart (co-PI), and Steve LaValle (PI). [$500,000]

2001–2006 NSF ITR/AP: Multiscale models for microstructure simulation and process design (DMR-0121695). With Jonathan A. Dantzig (co-PI), Michael Garland, Robert Haber (PI), Robert L. Jerrard, Duane D. Johnson (co-PI), Laxmikant Kale, John Sullivan, and Daniel A. Tortorelli. [$4,000,000]

2001–2006 NSF CAREER: Realistically efficient geometric algorithms (CCR-0093348). Sole principal investigator. [$325,000]

1999–2002 Alfred P. Sloan Research Fellowship [$36,000]

1996–1998 NSF Mathematical Sciences Postdoctoral Research Fellowship (DMS-9627683). [$75,000]

Plenary Lectures and Invited Tutorials

Dec 2022 The tragedy of being almost but not quite planar, 33rd International Symposium on Algorithms and Computation (ISAAC 2022), Seoul, South Korea [planned]

Sep 2020 Fun with toroidal spring embeddings [25][84], 28th International Symposium on Graph Drawing and Network Visualization (GD 2020), Vancouver, BC, Canada (online)

Aug 2020 Chasing puppies [28], Ferran Hurtado Memorial Lecture, 32nd Canadian Conference on Computational Geometry (CCCG 2020), Saskatoon, SK, Canada (online)

Mar 2019 Variations on a theme of Steinitz [23][81][83][25]. 35th European Workshop on Computational Geometry (EuroCG 2019), Utrecht, Netherlands

Sep 2018 Minicourse on algorithms for planar graphs and surface graphs [9][47]. 20 Aniversario de la Maestría en Computación, Centro de Investigacion en Matemáticas, Guanajuato, México

Jun 2018 One-dimensional computational topology [18][23][47][72][74][81]. Research School on "Low-Dimensional Geometry and Topology: Discrete & Algorithmic Aspects", Institut Henri Poincaré, Paris, France

May 2016 Untangling planar curves and planar graphs [23]. Topology, Geometry, and Data Analysis at OSU, The Ohio State University, Columbus, OH

Jul 2014 Computational topology of flows and cuts [18][71][74]. 9th International Colloquium on Graph Theory and Combinatorics, Grenoble, France

Oct 2013 Cuts and flows in planar and surface graphs [18][71][72][74]. Dagstuhl Seminar on Algorithms for Optimization Problems in Planar Graphs, Schloß Dagstuhl, Wadern, Germany

Jul 2013 Basic algorithms for surface-embedded graphs. ACAT summer school on computational topology and topological data analysis, Ljubljana, Slovenia

Jun 2013 Theoretical advances in hexahedral mesh generation. Workshop on mesh generation, 29th Annual Symposium on Computational Geometry, Rio de Janiero, Brazil

Jan 2011 Optimizing cycles and bases [19]. Short course on computational topology, AMS-MAA Joint Mathematics Meeting, New Orleans, LA

Oct 2010 Computational complexity of games: How playing checkers (but not Jenga) can make you a millionaire. 30th Annual Mathematics Symposium, Western Kentucky University, Bowling Green, KY

Aug 2010 Computational topology: Shortest paths, flows, and cuts [18][47][74]. Workshop on Barriers in Computational Complexity, Princeton Center for Computational Intractability, Princeton, NJ

Aug 2007 Finding small holes: A brief foray into computational topology [8][44][47][70]. 10th Workshop on Algorithms and Data Structures, Halifax, NS, Canada

Sep 2005 Computing (with) curves on surfaces [8][66]. 6th Max-Planck Advanced Course on the Foundations of Computer Science, Saarbrücken, Germany

Aug 2005 Computing optimal graphs on surfaces [8][66]. 17th Canadian Conference on Computational Geometry, Windsor, ON, Canada

Aug 2000 Kinetic data structures [38][58][59]. DIMACS Summer School on Foundations of Wireless Networks and Applications, Piscataway, NJ

Other Invited Workshop Talks

Sep 2019 Chasing puppies [28], ICERM workshop on Illustrating Geometry and Topology, Brown University, Providence, RI

May 2016 Untangling planar curves [23]. Topology, Geometry, and Data Analysis Conference at OSU, Columbus, OH.

Jun 2015 A brief (pre-)history of computational topology: Polygons and curves. 4th Annual Mini-symposium on Computational Topology, workshop at the 31st International Symposium on Computational Geometry, Eindhoven, Netherlands

May 2014 Hex meshing things with topology [21]. Applied Topology: Methods, Computation, and Science (ATMCS), Vancouver, BC

Feb 2014 Hex meshing things with topology [21]. IMSE Hot TIME Symposium, University of Illinois at Urbana-Champaign;

Aug 2013 Hex meshing things with topology [21]. Mathematical Congress of the Americas, Guanajuato, Mexico

Jan 2013 Transforming curves on surfaces redux [78]. AMS-MAA Joint Mathematics Meeting, San Diego, CA

Mar 2009 Homology flows, cohomology cuts [18]. Dagstuhl Seminar on Computational Geometry, Schloß Dagstuhl, Wadern, Germany

Jul 2005 Local polyhedra and geometric graphs [10]. Carleton–Eindhoven Workshop on Computational Geometry, Gatineau Park, Québec, Canada

May 2003 Well-spaced samples of generic surfaces have sparse Delaunay triangulations. DIMACS Workshop on Surface Reconstruction, Piscataway, NJ

Mar 2001 Nice point sets can have nasty Delaunay triangulations [8]. Dagstuhl Seminar on Computational Geometry, Schloß Dagstuhl, Wadern, Germany

Dec 1997 Raising roofs, crashing cycles, and playing pool [3]. 29th Computational Geometry Day, Courant Institute of Mathematical Sciences

Mar 1997 Raising roofs, crashing cycles, and playing pool [3]. Dagstuhl Seminar on Computational Geometry, Schloß Dagstuhl, Wadern, Germany

Invited Talks at Institutions

2019 Friday Colloquium, Berlin Mathematical School; Freie Universität Berlin; Universiteit Utrecht (twice)

2018 Centro de Investigacion en Matemáticas, Guanajuato, México

2016 Duke University; St. Louis University

2015 Princeton University

2014 Oregon State University

2012 Brown University; École Normale Supérieure (twice); Institute of Science and Technology Austria (twice)

2011 Århus Universitet/MADALGO; École Normale Supérieure; Institute of Science and Technology Austria; Universität des Saarlandes

2010 The Ohio State University

2009 California Institute of Technology

2008 Mathematics Department Colloquium, University of Illinois at Urbana-Champaign; Toyota Technological Institute; University of California, Irvine

2005 Århus Universitet; AT&T Labs, Florin Park, NJ; Courant Institute of Mathematical Sciences; École Normale Supérieure; Freie Universität Berlin (twice); Universitat Politècnica de Catalunya; University of Waterloo; Univerza v Ljubljiana

2004 École Normale Supérieure; Freie Universität Berlin; LORIA/INRIA Lorraine; Polytechnic University; Université Libre de Bruxelles

2002 Duke University; Sandia National Laboratory; Stanford University

2001 Los Alamos National Laboratory; McGill University; The Ohio State University; University of Waterloo

2000 Duke University; INRIA Sophia-Antipolis

1999 IBM Almaden Research Center

1998 Duke University (twice); The Johns Hopkins University; Massachusetts Institute of Technology; Middlebury College; University of Illinois at Urbana-Champaign (twice)

1997 The Johns Hopkins University; University of Maryland, College Park

1996 Duke University; Xerox Palo Alto Research Center

1994 Freie Universität Berlin; Max-Planck-Institut für Informatik, Saarbrücken (twice); Universiteit Utrecht

1993 NSF Regional Geometry Institute, Smith College

— Education —

Course Development

CS 374: Introduction to Algorithms and Models of Computation

A junior-level course in theoretical computer science. Developed and piloted with Lenny Pitt in Spring 2014, and required for all computer science and computer engineering majors since Fall 2015. Currently offered every semester, with a steady-state enrollment of 500–600 students per semester.

CS 473: Algorithms

An elective advanced algorithms course designed for advanced undergraduates and graduate students in computer science and related fields. Developed and piloted in Spring 2015. Currently offered every semester, with an average enrollment of 80–100 students per semester.

CS 498/598: Special Topics

Special-topics classes on various topics in theoretical computer science, including computational geometry, lower bounds, online algorithms, algorithms for massive data, advanced data structures, and computational topology. CS 498s are broader courses designed for undergraduates; CS 598s are deeper research-level courses designed for graduate students.

Instruction

Numbers after each class show current or final enrollment and student evaluations of instructor effectiveness/course quality (maximum 5.0/5.0). *Stars indicate inclusion in the university's "List of Teachers Ranked as Excellent by Their Students" based on these evaluations; **double stars indicate a rating recognized as outstanding. °Circles indicate courses offered both on-campus and online through our online master's program. This list spans several major course and curriculum revisions, including a 2005 campus-wide renumbering of all courses.

Semester	Class number and title	Students	ICES
Fall 2023	CS 374: Algorithms and Models of Computation *[tentative]*	(450)	
Spring 2023	CS 598: Special Topics: One-Dimensional Computational Topology	(30)	
Fall 2022	CS 473: Algorithms	110	4.81/4.76*
Spring 2022	CS 498: Special Topics: Computational Geometry	20	4.88/4.38
Fall 2021	CS 374: Algorithms and Models of Computation *Co-taught with Dakshita Khurana*	385	4.43/4.33*
Spring 2021	CS 498: Special Topics: Computational Geometry	20	4.91/4.82*
Fall 2020	CS 598: Special Topics: One-Dimensional Computational Topology	20	5.00/5.00**
Spring 2020	CS 473: Algorithms	135	4.82/4.75*
Fall 2019	CS 374: Algorithms and Models of Computation	325	4.7/4.3*
2018–2019	— On sabbatical —		
Spring 2018	CS 374: Algorithms and Models of Computation	275	4.7/4.4*
Fall 2017	CS 598: Special Topics: One-Dimensional Computational Topology	15	4.9/4.7*
Spring 2017	CS 473: Algorithms	100	5.0/4.9**
Fall 2016	CS 374: Algorithms and Models of Computation *Co-taught with Alexandra Kolla*	405	4.4/3.9
Spring 2016	CS 473: Algorithms	105	4.9/4.7*
Fall 2015	CS 598: Special Topics: Advanced Data Structures	30	4.7/4.7*
Spring 2015	CS 473: Algorithms *Pilot for revised senior- and graduate-level elective course*	50	5.0/4.9**
Fall 2014	CS 374: Algorithms and Models of Computation	75	4.7/4.6*
Spring 2014	CS 374: Algorithms and Models of Computation *Co-taught with Lenny Pitt, pilot for new junior-level course required for all computer science and computer engineering majors*	40	4.7/4.3
Fall 2013	CS 473: Undergraduate Algorithms	190	4.9/4.7*
Spring 2013	CS 598: Special Topics: Computational Topology	10	(no evals)
Fall 2012	CS 473: Undergraduate Algorithms	175	4.8/4.4*

2011–2012	— On sabbatical —		
Spring 2011	CS 598: Special Topics: Advanced Data Structures	10	4.9/4.8*
Fall 2010	CS 573: Graduate Algorithms	60	4.9/4.7*
Spring 2010	CS 473: Undergraduate Algorithms	115	4.73/4.46*
Fall 2009	CS 598: Special Topics: Computational Topology	10	4.56/4.44
Spring 2009	CS 473: Undergraduate Algorithms	80	4.76/4.15
Fall 2008	CS 573: Graduate Algorithms	40	4.65/4.33
Spring 2008	CS 598: Special Topics: Computational Geometry	15	4.6/4.5*
Fall 2007	CS 173: Discrete Mathematical Structures *Co-taught with Cinda Heeren*	180	3.8/3.6
Spring 2007	CS 473G: Graduate Algorithms	25	4.7/4.6*
Fall 2006	CS 473U: Undergraduate Algorithms	100	4.8/4.4*
Spring 2006	CS 573: Topics in Analysis of Algorithms: Advanced Data Structures	15	4.7/4.3
Fall 2005	CS 473G: Graduate Algorithms°	60	4.6/4.6*
2004–2005	— On sabbatical —		
Spring 2004	CS 373U: Undergraduate Algorithms	150	4.5/3.8
Fall 2003	CS 473: Topics in Analysis of Algorithms: Algorithms for Massive Data	20	(no evals)
Spring 2003	CS 497: Special Topics: Concrete Models of Computation	20	4.6/4.4
Fall 2002	CS 373: Combinatorial Algorithms°	320	4.5/4.1
Spring 2002	CS 497: Special Topics: Computational Geometry	15	4.8/4.4
Fall 2001	CS 473: Topics in Analysis of Algorithms: Online Algorithms	15	5.0/4.8*
Spring 2001	CS 373: Combinatorial Algorithms°	180	4.9/4.7**
Fall 2000	CS 373: Combinatorial Algorithms	150	4.8/4.6*
Spring 2000	CS 497: Special Topics: Computational Geometry	20	4.6/4.5
Fall 1999	CS 173: Discrete Mathematical Structures	200	4.4/4.1
Spring 1999	CS 373: Combinatorial Algorithms°	140	4.8/4.6*
Fall 1998	CS 497: Special Topics: Geometric Data Structures	5	4.3/4.3
1998–2021	**Average student evaluations (weighted by class size)**	4315	**4.67/4.39**

Mentorship

Current students

- Christian Howard, Ph.D. expected 2025

Former Ph.D. students and postdocs

- Patrick Lin, Ph.D. 2021. *Equilibrium Graphs on the Flat Torus, or Finding Zen Amidst the Bull*.
  - Software engineer (since 2021), Google, Mountain View, California
- Yipu Wang, Ph.D. 2020. *Algorithms for Flows and Disjoint Paths in Planar Graphs*.
  - Postdoctoral researcher (since 2020), Sandia National Labs
- Hsien-Chih Chang, Ph.D. 2018. *Tightening Curves and Graphs on Surfaces*.
  - Assistant professor (since 2020), Department of Computer Science, Dartmouth College

- Kyle Fox, Ph.D. 2013. *Fast Algorithms for Surface Embedded Graphs via Homology*.
  - Assistant professor (since 2017), Department of Computer Science, University of Texas at Dallas
- Anastasios Sidiropoulos (Ph.D. 2008 MIT), postdoc 2012–2013, co-hosted with Sariel Har-Peled
  - Associate professor (since 2019), Department of Computer Science, University of Illinois, Chicago
- Amir Nayyeri, Ph.D. 2012. *Combinatorial Optimization of Embedded Curves*.
  - Associate professor (since 2020), Department of Electrical Engineering and Computer Science, Oregon State University, Corvallis
  - **Former Ph.D. students:**
    - Hanzhong Xu, Ph.D. 2020. Software Engineer at Google, Sunnyvale, California
    - William Maxwell, Ph.D. 2021. Scientist at Naval Surface Warfare Center, Dahlgren, Virginia
- Erin Wolf Chambers, Ph.D. 2008. *Finding Interesting Topological Features*.
  - Professor (since 2018), Department of Computer Science, Saint Louis University, St. Louis, Missouri
  - **Former Ph.D. students:**
    - Kyle Sykes, Ph.D. 2016. Senior Data Scientist at Allscripts, Glen Carbon, Illinois
    - Rehab Alharbi, Ph.D. 2021. Assistant professor at Jazan University, Saudi Arabia
- David Bunde, Ph.D. 2006. *Scheduling and Admission Control*.
  - William & Marilyn Ingersoll Chair (since 2019) and former department chair, Department of Computer Science, Knox College, Galesburg, Illinois
- Shripad Thite, Ph.D. 2005. *Spacetime Meshing for Discontinuous Galerkin Methods*.
  - Software engineer, Facebook, San Francisco, California
- Alper Üngör, Ph.D. 2002, co-advised with Shang-Hua Teng. *Parallel Delaunay Refinement and Space-Time Meshing*.
  - Associate professor (since 2010), Department of Computer & Information Science & Engineering, University of Florida, Gainesville
  - **Former Ph.D. students**:
    - Hale Erten, Ph.D. 2009. Software engineer at Intel, Portland, Oregon
    - Homer "Scooter" Willis, Ph.D. 2010. Co-founder and chairman of the board, TechGarage, Boca Raton, Florida.
    - Paul Accisano, Ph.D. 2014. Software engineer at Microsoft, Redmond, Washington
    - Anubhav Singh, Ph.D. 2014. Senior Software Engineer at Microsoft, Redmond, Washington
    - Eyup Serdar Ayaz, Ph.D. 2018. Software Engineer at Philips, Gainesville, Florida

Former M.S. students

- Kieran Kaempen, M.S. 2022. *The Art Gallery Problem in Polyomino Corridors*.
- Christian Howard, M.S. 2019. *Spacetime Meshing of Stratified Spaces for Spacetime Discontinuous Galerkin Methods in Arbitrary Spatial Dimensions*. Ph.D. student at Illinois since August 2019.
- Alexander Steiger, M.S. 2017. *Single-Face Non-Crossing Shortest Paths in Planar Graphs*. Ph.D. student at Duke University since August 2017.
- Alexander Mont, M.S. 2011. *Adaptive Unstructured Spacetime Meshing for Four-Dimensional Spacetime Discontinuous Galerkin Finite Element Methods*. Senior Software Engineer, Common Networks, San Francisco, CA.
- Kyle Fox, M.S. 2010. *Online Scheduling on Identical Machines using SRPT*. See above.

- Aparna Sundar, M.S. 2009. *More Homology Flows*. Software Engineer, Zenoss, Austin, Texas.
- Tracy Russell (née Grauman), M.S. 2008. *Making Sense of Making Change*. Firefly Health, Collingswood, New Jersey.
- Pratik Worah, M.S. 2008 (Applied Mathematics). *Finding Nontrivial Cycles in Topological Spaces*. Ph.D. 2013, University of Chicago, advised by Janos Simon. Google Research, New York.
- Kevin Milans, M.S. 2006. *The Complexity of Graph Pebbling*. Ph.D. 2010 in Mathematics, advised by Doug West. Associate professor (since 2018) of mathematics at West Virginia University.
- Daniel Cranston, M.S. 2003. *Coloring for Efficient Computation of Jacobians*. Ph.D. 2007, advised by Doug West. Associate professor (since 2015) of computer science at Virginia Commonwealth University.
- Amit K. Patel, M.S. 2003. *Line Transversals in* $\mathbb{R}^3$. Ph.D. 2010, Duke University, advised by Herbert Edelsbrunner. Associate professor of mathematics (since 2022), Colorado State University.
- David Bunde, M.S. 2002. *Approximating Total Flow Time*. See above.
- Matthew Hayward, M.S. 2002. *Lower Query Bounds in the Quantum Oracle Model*. Technical Program Manager at Google, San Francisco, California.

Former B.S. students (senior theses)

- Luvsandondov Lkhamsuren, B.S. 2016. *Multiple-Source Shortest Paths in Unweighted Embedded Graphs*. Software engineer at AirBnB since May 2016.
- Robert Weber, B.S. 2015. *Embedded-width of Planar Graphs*. Ph.D. 2020, University of Washington. Assistant teaching professor at University of Washington since 2020.
- Daniel Larkin-York (né Larkin), B.S. 2011. *An Experimental Comparison of Heaps*. Ph.D. 2015, Princeton University. Senior Software Engineer at MongoDB, St Petersburg, Florida since 2021.
- Luigi Marini, B.S. 2002. *Edge-Coloring Graphs*. Research programmer at National Center for Supercomputing Applications, Urbana, Illinois.

Other thesis committees (Ph.D. in Computer Science from Illinois unless otherwise indicated)

- Current: Robert Andrews, Mishal Assif P K (Electrical and Computer Engineering), Rucha Kulkarni
- 2020: Ching-Hua Yu
- 2019: Kent Quanrud, Omer Gold (Tel Aviv University)
- 2018: Tim Ophelders (Technische Universiteit Eindhoven), Chao Xu
- 2015: Kaushik Kalyanaraman, Daniel Larkin-York (Princeton University), Yahav Nussbaum (Tel Aviv University), Benjamin Raichel
- 2014: Hanna Erickson, Nirman Kumar, Arnaud de Mesmay (École Normale Supérieure), Steve Oudot (Habilitation, Université Paris-Sud)
- 2012: Hayim Shaul (Tel Aviv University), Shay Mozes (Brown University), Sungjin Im
- 2011: Kostas Tsakalidis (Århus Universitet)
- 2010: Nitish Korula
- 2009: Bill Cochran, Evan VanderZee (Mathematics), Michael Wolf, Feida Zhu
- 2008: Hamidreza Chitsaz, Gio Kao, Stephen Kloder, Anna Yershova
- 2007: Ke Chen, Dan Cranston, Shen Dong, Xinlai Ni, Jason O'Kane
- 2006: Svetlana Lazebnik, Bardia Sadri
- 2005: Masud Hasan (University of Waterloo), Peng Cheng, Sung-Il Pae, Eric Shaffer
- 2004: Fred Rothganger, Xavier Goaoc (Université de Nancy 2)
- 2002: Derek Armstrong (Industrial Engineering), Tanya Berger-Wolf, Ho-Lun (Alan) Cheng
- 2001: Damrong Guoy, Peter Leven (Electrical and Computer Engineering), Ali Pınar, Radhika Ramamurthi (Mathematics), Afra Zomorodian

- 2000: Xiang-Yang Li
- 1999: André Kündgen (Mathematics)

— Service —

Department and University

Departmental service

- ***Associate department head*** 2013–2016, primarily responsible for tenure-track faculty recruiting.
  - Eleven tenure-track faculty hired during my term, including two endowed full professors
- Major departmental committees
  - Advisory: 2000–2003, 2012–2014, 2016–2018, 2022–2024; ***chair*** 2017–2018, 2022–2023 (committee elected by the faculty, chair elected by the committee)
  - Broadening participation in computing: 2019–2020, 2021–2022
  - CARES (anti-harassment): 2021–2022
  - Chairs and Professorships, 2021–2023
  - Graduate admissions: 1999–2000, 2002–2004, 2012–2013
  - Teaching faculty recruiting: 2015–2016, 2020–2022
  - Promotions and tenure: 2010–2018, 2019–2024 (elected by the faculty since 2017)
  - Tenure-track faculty recruiting: 2000–2004, 2005–2011, 2012–2017; ***chair*** 2013–2016
  - Undergraduate curriculum revision: 2011–2015
- Other departmental service
  - Algorithms and theoretical computer science area chair, 2005–2011, 2016–2017

Other university service

- Senate of the Urbana-Champaign Campus, 2005–2007, 2009–2011 (elected by CS department faculty)
  - General University Policy committee, 2009–2011
- College of Engineering service
  - Department of Computer Science head search committee, 2007–2009
  - Department of Computer Science head search committee, 2017–2018
  - Promotions and tenure committee, 2022–2024
  - Education Innovation Fellow, 2017–2018, 2019–2021
  - Engineering-Mathematics liaison, 2007–2011, 2015–2018
  - Equal Employment Opportunity Officer, 2015–2018
  - "Leaning into 2020" (COVID-19 response coordination), 2020–2021

Professional

Professional society service

- ACM SIGACT Committee for the Advancement of Theoretical Computer Science, 2013–2015

Editorial service

- *Discrete & Computational Geometry*, since 2007
- *Journal of Applied and Computational Topology*, 2016–2022

- CoRR/ArXiv moderator for Computational Geometry (cs.CG) and Discrete Mathematics (cs.DM), 2007–2019
- Guest editor, *Discrete & Computational Geometry* 42(1), 2009, special issue of invited papers from the 23rd Annual Symposium on Computational Geometry (2007) [93]
- *Journal on Computational Geometry*, 2009–2015 (founding editorial board)
- *SIAM Journal on Computing*, 2010–2012
- Guest editor (with Scott Aaronson, Mohammad Mahdian, R. Ravi, and Emanuele Viola), *SIAM Journal on Computing* 40(3), 2011, special section of invited papers from the 49th IEEE Symposium on Foundations of Computer Science (2008) [94].

Conference committee chairing (*Submissions not accepted from committee members)

- Workshop committee chair, 30th Annual Symposium on Computational Geometry (2014)
- ***Steering committee chair***, Symposium on Computational Geometry, 2013–2016 (committee members elected by the SoCG community, officers elected by the committee)
  - Oversaw the 2014 community vote ending SoCG's 30-year affiliation with ACM. For details, see http://makingSoCG.wordpress.com.
  - STOC/STOC 2016 colocation committee (*ex officio*)
- Program committee chair, 23rd Annual Symposium on Computational Geometry (2007)*
- Video Review committee chair, 15th Annual Symposium on Computational Geometry (1999)

Conference program and steering committees (*Submissions not accepted from committee members)

- 39th International Symposium on Computational Geometry (2023) — *first year with double-blind reviews, first year with program-committee submissions*
- 33rd Annual ACM-SIAM Symposium on Discrete Algorithms (2022) — *first year with double-blind reviews*
- 2021 ASEE Illinois/Indiana Section Conference
- 2019 Symposium on Simplicity in Algorithms
- 34th International Symposium on Computational Geometry (2018)*
- 28th Annual ACM-SIAM Symposium on Discrete Algorithms (2017)*
- 8th International Conference on Fun with Algorithms (2016)
- ***Steering committee***, Symposium on Computational Geometry, 2013–2016 (elected by the SoCG community)
- 45th Annual ACM Symposium on Theory of Computing (2013)*
- 24th Canadian Conference on Computational Geometry (2012)*
- 3rd Symposium on Innovations in Theoretical Computer Science (2012)
- 21st Canadian Conference on Computational Geometry (2009)*
- 49th IEEE Symposium on Foundations of Computer Science (2008)*
- 13th ACM Symposium on Solid and Physical Modeling (2008)
- 19th Canadian Conference on Computational Geometry (2007)
- ***Steering committee***, Symposium on Computational Geometry, 2006–2009 (elected by the SoCG community)
- 18th Annual ACM-SIAM Symposium on Discrete Algorithms (2007)*
- 47th IEEE Symposium on Foundations of Computer Science (2006)*
- 10th Scandinavian Workshop on Algorithm Theory (2006)*
- 14th Annual ACM-SIAM Symposium on Discrete Algorithms (2003)*
- ***Steering committee***, Symposium on Computational Geometry, 2001–2003 (elected by the SoCG community)

- 11th Annual International Symposium on Algorithms and Computation (2000)*
- 16th Annual Symposium on Computational Geometry, theory track (2000)*

Workshop organization and other committees

- Lead SafeTOC (anti-harassment) advocate for the ACM-SIAM Symposium on Discrete Algorithms, since 2020
- SafeTOC advocate for the International Symposium on Computational Geometry, since 2020
- Organizing committee, Dagstuhl Seminar on Computational Geometry (2019)
- Organizing committee, 60th birthday workshop for Herbert Edelsbrunner, Raimund Seidel, and Emo Welzl, 34th International Symposium on Computational Geometry (2018)
- Organizing committee, Dagstuhl Seminar on Computational Geometry (2017)
- Organizing committee, Dagstuhl Seminar on Optimization in Planar Graphs (2016)
- Organizing committee, Oberwolfach Seminar on Computational Geometric and Algebraic Topology (2015)
- Organizing committee, Dagstuhl Seminar on Computational Geometry (2015)
- Program committee, 6th Workshop on Massive Data Algorithmics (2014)
- Workshop committee, 29th Annual Symposium on Computational Geometry (2013)
- Young Researchers Forum committee, 28th Annual Symposium on Computational Geometry (2012)
- Organizing committee, 15th Annual Fall Workshop on Computational Geometry and Visualization (2005)
- Organizer, minisymposium on computational geometry, SIAM Conference on Discrete Mathematics (2004)
- Organizing committee, 7th Annual Fall Workshop on Computational Geometry (1997)

Reviewing and refereeing

- **Book reviewer** for the American Mathematical Society and Princeton University Press
- **Proposal panelist/reviewer** for the National Science Foundation (CCF, DMS, CAREER, and GFRP), the Army Research Office, the Department of Defense (EPSCoR), the European Research Council, the Israeli Science Foundation, the Netherlands Organisation for Scientific Research (NWO), and the U.S.–Israel Binational Science Foundation (BSF)
- **Referee** for *ACM Journal of Experimental Algorithmics*; *ACM Transactions on Algorithms*; *ACM Transactions on Database Systems*; *Algebraic and Geometric Topology*; *Algorithmica*; *Computational Geometry: Theory and Applications*; *Computational Statistics and Data Analysis*; *Discrete & Computational Geometry*; *Discrete Mathematics*; *Engineering with Computers*; *Graphical Models and Image Processing*; *IEEE Transactions on Dependable and Secure Computing*; *IEEE Transactions on Pattern Recognition and Machine Intelligence*; *IEEE Transactions on Robotics and Automation*; *Information Processing Letters*; *International Journal of Computational Geometry and Applications*; *International Journal of Robotics Research*; *Israeli Journal of Mathematics*; *Journal of Applied and Computational Topology*; *Journal of the ACM*; *Journal on Computational Geometry*; *Journal of Computer and System Sciences*; *Proceedings of Symposia in Applied Mathematics* (AMS); *SIAM Journal on Computing*; and *Software: Practice & Experience*
- **External reviewer** for ACM-SIAM Symposium on Discrete Algorithms [SODA] (19 years between 1998 and 2023); ACM Symposium on Solid Modeling and Applications (1999); ACM Symposium on Theory of Computing [STOC] (10 years between 1999 and 2019); Algorithms and Data Structures Symposium [WADS] (2007 and 2011); Conference on Integer Programming and Combinatorial Optimization [IPCO] (2020); Eurographics (2002); European Symposium on Algorithms [ESA] (8 years between 2002 and 2020); Fall Workshop on Computational Geometry (1996); IEEE Conference on Automation Science and Engineering [CASE] (2008); IEEE Conference on Computational Complexity [CCC] (2013); IEEE Symposium on Foundations of Computer Science [FOCS] (14 years between 1994 and 2020); International Colloquium on Automata, Languages, and Programming [ICALP]

(2008 and 2010); International Meshing Roundtable [IMR] (5 years between 2000 and 2008); International Symposium on Experimental Algorithms [SEA] (2009); International Symposium on Theoretical Aspects of Computer Science [STACS] (2000 and 2013); Pacific Conference on Computer Graphics and Applications [PG] (2009); Robotics: Science and Systems Conference [RSS] (2009); Scandinavian Symposium and Workshops on Algorithm Theory [SWAT] (2014); SIAM Meeting on Algorithm Engineering and Experimentation [ALENEX] (2008 and 2014); SIGGRAPH (8 years between 2001 and 2019); and Symposium on Computational Geometry [SoCG] (19 years between 1995 and 2021)