

David Doty

2069 Academic Surge
University of California, Davis
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Assistant Professor
Department of Computer Science
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<http://web.cs.ucdavis.edu/~doty/>

- RESEARCH INTERESTS ◇ chemical reaction networks, distributed computing, algorithmic self-assembly, algorithmic information theory, computational complexity
- ACADEMIC POSITIONS ◇ **University of California, Davis**, Davis, California, USA
Jul. 2015 – present
Assistant Professor of Computer Science
- ◇ **California Institute of Technology**, Pasadena, California, USA
Sep. 2010 – Jul. 2015
Senior Research Fellow/Postdoctoral Scholar in Computing and Mathematical Sciences
Supervisor: Erik Winfree
- ◇ **University of Western Ontario**, London, Ontario, Canada
Sep. 2009 – Sep. 2010
Postdoctoral Fellow in Computer Science
Supervisor: Lila Kari
- EDUCATION ◇ **Iowa State University**, Ames, Iowa, USA
Ph.D. in Computer Science, 2009
Ph.D. Thesis: *Applications of the theory of computation to nanoscale self-assembly*
Advisors: Jack H. Lutz and James I. Lathrop
- ◇ **Iowa State University**, Ames, Iowa, USA
M.S. in Computer Engineering, 2002
Master's Thesis: *Genetic algorithm-based simulation of electric power markets*
Advisor: Gerald B. Sheblé
- ◇ **Iowa State University**, Ames, Iowa, USA
B.S. in Computer Engineering, 2001
Honors Thesis: *Evolving 3-D tic-tac-toe strategies*
Honors Advisor: Daniel Ashlock
- AWARDS ◇ Best paper award at DISC 2014, “Speed faults in computation by chemical reaction networks”, with Ho-lin Chen, Rachel Cummings, and David Soloveichik
- ◇ [Aalto Science Fellowship](#), 2012, 3-year postdoc fellowship to pursue independent research at Aalto University, Helsinki, Finland, awarded to 3 recipients out of 167 applicants (declined)
- ◇ CCC-CRA-NSF [Computing Innovation Fellowship](#), 2010, 2-year postdoc fellowship
- ◇ Iowa State Univ. Teaching Excellence Award, 2007
- ◇ Pioneer Hi-Bred/National Science Foundation Graduate Research Fellowship (2005–2006)
- ◇ National Science Foundation Integrative Graduate Education and Research Traineeship (IGERT) Fellowship (2002–2004)
- ◇ Iowa State Univ. Electrical and Computer Engineering Graduate Excellence Fellowship (2002)
- ◇ Iowa State Univ. National Merit Undergraduate Scholarship (1997–2001)
- ◇ Union Pacific Undergraduate Scholarship (1997–2001)

Note on author order: In most cases my co-authors and I have followed the common mathematics/theoretical computer science convention of alphabetically-ordered authors. Exceptions are marked with $[\beta]$.

- PUBLICATIONS
- ◇ David Doty and Shaopeng Zhu.
Computational complexity of atomic chemical reaction networks.
SOFSEM 2018: *Proceedings of the 44th International Conference on Current Trends in Theory and Practice of Computer Science*.
 - ◇ David Doty, Trent Rogers, David Soloveichik, Chris Thachuk, and Damien Woods.
Thermodynamic binding networks.
DNA 2017: *Proceedings of the 23rd International Meeting on DNA Computing and Molecular Programming*.
 - ◇ Amanda Belleville, David Doty, and David Soloveichik.
Hardness of computing and approximating predicates and functions with leaderless population protocols.
ICALP 2017: *Proceedings of the 44th International Colloquium on Automata, Languages and Programming*.
 - ◇ Ho-Lin Chen and David Doty.
Parallelism and time in hierarchical self-assembly.
SICOMP 2017: *SIAM Journal on Computing* 46(2):661-709, 2017.
 - ◇ David Doty and Andrew Winslow.
Design of geometric molecular bonds.
T-MBMC 2017: *IEEE Transactions on Molecular, Biological, and Multiscale Communications* 3(1):13-23. Invited paper.
 - ◇ Robert Brijder, David Doty, and David Soloveichik.
Democratic, existential, and consensus-based output conventions in stable computation by chemical reaction networks.
NaCo to appear: *Natural Computing*, to appear. Special issue of invited papers from DNA 2016.
 - ◇ David Doty and David Soloveichik.
Stable leader election in population protocols requires linear time.
DIST to appear: *Distributed Computing*, to appear. Special issue of invited papers from DISC 2015.
 - ◇ Ho-Lin Chen, Rachel Cummings, David Doty, and David Soloveichik.
Speed faults in computation by chemical reaction networks.
DIST 2017: *Distributed Computing* 30(5): 373-390, 2017. Special issue of invited papers from DISC 2013, DISC 2014, and PODC 2014.
 - ◇ Robert Brijder, David Doty, and David Soloveichik.
Robustness of expressivity in chemical reaction networks.
DNA 2016: *Proceedings of the 22nd International Meeting on DNA Computing and Molecular Programming*.
 - ◇ David Doty.
Hierarchical self-assembly.
EOA 2016: *Encyclopedia of Algorithms*, pp. 903-909, 2016. Invited book chapter.
 - ◇ David Doty.
Randomized self-assembly.
EOA 2016: *Encyclopedia of Algorithms*, pp. 1759-1767, 2016. Invited book chapter.
 - ◇ David Doty and Andrew Winslow.
Design of geometric molecular bonds.
ISIT 2016: *Proceedings of the 2016 IEEE International Symposium on Information Theory*.

- ◇ Ho-Lin Chen, David Doty, Ján Maňuch, Arash Rafiey, and Ladislav Stacho.
Pattern overlap implies runaway growth in hierarchical tile systems.
JoCG 2016: *Journal of Computational Geometry* 7(2):3-18, 2016. Special issue of invited papers from SoCG 2015.
- ◇ David Doty.
Producibility in hierarchical self-assembly.
NaCo 2016: *Natural Computing* 15(1):41-49, 2016. Special issue of invited papers from UCNC 2014.
- ◇ Rachel Cummings, David Doty, and David Soloveichik.
Probability 1 computation with chemical reaction networks.
NaCo 2016: *Natural Computing* 15(2):245-261, 2016. Special issue of invited papers from DNA 2014.
- ◇ David Doty and David Soloveichik.
Stable leader election in population protocols requires linear time.
DISC 2015: *Proceedings of the 29th International Symposium on Distributed Computing*.
- ◇ [β] Rebecca Schulman and David Doty.
Designing ordered nucleic acid self-assembly processes.
COSTBI 2015: *Current Opinion in Structural Biology* 31: 57-63, 2015. Invited review article.
- ◇ Ho-Lin Chen, David Doty, Ján Maňuch, Arash Rafiey, and Ladislav Stacho.
Pattern overlap implies runaway growth in hierarchical tile systems.
SoCG 2015: *Proceedings of the 31st International Symposium on Computational Geometry*.
- ◇ David Doty and Monir Hajiaghayi.
Leaderless deterministic chemical reaction networks.
NaCo 2015: *Natural Computing* 14(2):213-223, 2015. Special issue of invited papers from DNA 2013.
- ◇ Ho-Lin Chen, David Doty, and Shinnosuke Seki.
Program size and temperature in self-assembly.
Algorithmica 2015: *Algorithmica* 72(3):884-899, 2015.
- ◇ Ho-Lin Chen, Rachel Cummings, David Doty, and David Soloveichik.
Speed faults in computation by chemical reaction networks.
DISC 2014: *Proceedings of the 28th International Symposium on Distributed Computing*.
Best paper award.
- ◇ Rachel Cummings, David Doty, and David Soloveichik.
Probability 1 computation with chemical reaction networks.
DNA 2014: *Proceedings of the 20th International Meeting on DNA Computing and Molecular Programming*.
- ◇ Ho-Lin Chen, David Doty, Dhiraj Holden, Chris Thachuk, Damien Woods, and Chun Tao Yang.
Fast algorithmic self-assembly of simple shapes using random agitation.
DNA 2014: *Proceedings of the 20th International Meeting on DNA Computing and Molecular Programming*.
- ◇ David Doty.
Producibility in hierarchical self-assembly.
UCNC 2014: *Proceedings of the 13th International Conference on Unconventional Computation and Natural Computation*.
- ◇ Ho-Lin Chen, David Doty, and David Soloveichik.
Rate-independent computation in continuous chemical reaction networks.
ITCS 2014: *Proceedings of the 5th Innovations in Theoretical Computer Science Conference*.

- ◇ David Doty.
Timing in chemical reaction networks.
SODA 2014: *Proceedings of the 25th ACM-SIAM Symposium on Discrete Algorithms*.
- ◇ Ho-Lin Chen, David Doty, and David Soloveichik.
Deterministic function computation with chemical reaction networks.
NaCo 2014: *Natural Computing* 13(4):517-534, 2014. Special issue of invited papers from DNA 2012.
- ◇ David Doty and Monir Hajiaghayi.
Leaderless deterministic chemical reaction networks.
DNA 2013: *Proceedings of the 19th International Meeting on DNA Computing and Molecular Programming*.
- ◇ David Doty, Lila Kari, and Benoît Masson.
Negative interactions in irreversible self-assembly.
Algorithmica 2013: *Algorithmica* 66(1): 153-172, 2013.
- ◇ Nathaniel Bryans, Ehsan Chiniforooshan, David Doty, Lila Kari, and Shinnosuke Seki.
The power of nondeterminism in self-assembly.
ToC 2013: *Theory of Computing* 9(1): 1-29, 2013.
- ◇ David Doty, Jack H. Lutz, Matthew J. Patitz, Robert T. Schweller, Scott M. Summers, and Damien Woods.
The tile assembly model is intrinsically universal.
FOCS 2012: *Proceedings of the 53rd IEEE Symposium on Foundations of Computer Science*.
- ◇ Ho-Lin Chen, David Doty, and David Soloveichik.
Deterministic function computation with chemical reaction networks.
DNA 2012: *Proceedings of the 18th International Meeting on DNA Computing and Molecular Programming*.
- ◇ David Doty.
Theory of algorithmic self-assembly.
CACM 2012: *Communications of the ACM* 55(12): 78-88, 2012. Invited review article.
7-minute video to introduce article: <https://vimeo.com/54214122>
- ◇ Ho-Lin Chen and David Doty.
Parallelism and time in hierarchical self-assembly.
SODA 2012: *Proceedings of the 23rd ACM-SIAM Symposium on Discrete Algorithms*.
- ◇ Ho-Lin Chen, David Doty, and Shinnosuke Seki.
Program size and temperature in self-assembly.
ISAAC 2011: *Proceedings of the 22nd International Symposium on Algorithms and Computation*.
- ◇ David Doty, Matthew J. Patitz, and Scott M. Summers.
Limitations of self-assembly at temperature 1.
TCS 2011: *Theoretical Computer Science* 412(1-2):145-158, 2011. Special issue of invited papers from Complexity of Simple Programs workshop in Cork, Ireland, 2008.
- ◇ Nathaniel Bryans, Ehsan Chiniforooshan, David Doty, Lila Kari, and Shinnosuke Seki.
The power of nondeterminism in self-assembly.
SODA 2011: *Proceedings of the 22nd ACM-SIAM Symposium on Discrete Algorithms*.
- ◇ David Doty.
Randomized self-assembly for exact shapes.
SICOMP 2010: *SIAM Journal on Computing* 39(8):3521-3552, 2010.
- ◇ David Doty, Matthew J. Patitz, Dustin Reishus, Robert T. Schweller, and Scott M. Summers.
Strong fault-tolerance for self-assembly with fuzzy temperature.
FOCS 2010: *Proceedings of the 51st IEEE Symposium on Foundations of Computer Science*.

- ◇ Ehsan Chiniforooshan, David Doty, Lila Kari, and Shinnosuke Seki.
Scalable, time-responsive, digital, energy-efficient molecular circuits using DNA strand displacement.
DNA 2010: *Proceedings of the 16th International Meeting on DNA Computing and Molecular Programming.*
- ◇ David Doty, Lila Kari, and Benoît Masson.
Negative interactions in irreversible self-assembly.
DNA 2010: *Proceedings of the 16th International Meeting on DNA Computing and Molecular Programming.*
- ◇ David Doty, Jack H. Lutz, Matthew J. Patitz, Scott M. Summers, and Damien Woods.
Intrinsic universality in self-assembly.
STACS 2010: *Proceedings of the 27th International Symposium on Theoretical Aspects of Computer Science.* Invited to the special issue of Theory of Computing Systems containing the best papers from STACS 2010 (declined).
- ◇ David Doty.
Randomized self-assembly for exact shapes.
FOCS 2009: *Proceedings of the 50th IEEE Symposium on Foundations of Computer Science.*
- ◇ David Doty, Jack H. Lutz, Matthew J. Patitz, Scott M. Summers, and Damien Woods.
Random number selection in self-assembly.
UC 2009: *Proceedings of the 8th International Conference on Unconventional Computation.*
- ◇ David Doty and Matthew J. Patitz.
A domain-specific language for programming in the tile assembly model.
DNA 2009: *Proceedings of the 15th International Meeting on DNA Computing and Molecular Programming.*
- ◇ David Doty, Matthew J. Patitz, and Scott M. Summers.
Limitations of self-assembly at temperature 1.
DNA 2009: *Proceedings of the 15th International Meeting on DNA Computing and Molecular Programming.*
- ◇ Laurent Bienvenu, David Doty, and Frank Stephan.
Constructive dimension and Turing degrees.
ToCS 2009: *Theory of Computing Systems* 45(4):740–755, 2009. Special issue of invited papers from Computability in Europe 2007.
- ◇ David Doty.
Dimension extractors and optimal decompression.
ToCS 2008: *Theory of Computing Systems* 43(3–4):425–463, 2008. Special issue of invited papers from Computability in Europe 2006.
- ◇ David Doty, Jack H. Lutz, and Satyadev Nandakumar.
Finite-state dimension and real arithmetic.
I&C 2007: *Information and Computation* 205(11):1640–1651, 2007.
- ◇ David Doty and Jared Nichols.
Pushdown dimension.
TCS 2007: *Theoretical Computer Science* 381(1–3):105–123, 2007.
- ◇ David Doty and Philippe Moser.
Feasible depth.
CiE 2007: *Proceedings of the 3rd Conference on Computability in Europe.*
- ◇ Laurent Bienvenu, David Doty, and Frank Stephan.
Constructive dimension and weak truth-table degrees.
CiE 2007: *Proceedings of the 3rd Conference on Computability in Europe.*
- ◇ David Doty, Jack H. Lutz, and Satyadev Nandakumar.
Finite-state dimension and real arithmetic.

ICALP 2006: *Proceedings of the 33rd International Colloquium on Automata, Languages and Programming.*

◇ David Doty.

Every sequence is decompressible from a random one.

CiE 2006: *Proceedings of the 2nd Conference on Computability in Europe.*

◇ David Doty, Xiaoyang Gu, Jack H. Lutz, Elvira Mayordomo, and Philippe Moser.
Zeta-dimension.

MFCS 2005: *Proceedings of the 30th Symposium on Mathematical Foundations of Computer Science.*

◇ David Doty.

Non-local evolutionary adaptation in gridplants.

CEC 2004: *Proceedings of the 2004 IEEE Congress on Evolutionary Computation.*

◇ Dan Ashlock, Dean C. Adams, and David Doty.

Morphometric grayscale texture analysis using foot patterns.

CEC 2003: *Proceedings of the 2003 IEEE Congress on Evolutionary Computation.*

INVITED TALKS ◇ Hardness of computing and approximating predicates and functions with leaderless population protocols.

JMM 2018: Joint Mathematics Meetings, AMS Special Session on Emergent Phenomena in Discrete Models, San Diego, CA, USA, Jan 2018.

◇ (Plenary talk) Limits of chemical computing.

DNA 2017: *23rd International Meeting on DNA Computing and Molecular Programming*, Austin, Texas, USA, Sept 2017.

◇ (Tutorial) DNA tile self-assembly.

DNA 2017: *23rd International Meeting on DNA Computing and Molecular Programming*, Austin, Texas, USA, Sept 2017.

◇ Limits of chemical computing.

CS Departmental Seminar, University of Liverpool, UK, Sept 2017.

◇ Thermodynamic binding networks.

Workshop on Thermodynamics and Computation: Towards a New Synthesis, Santa Fe Institute, Aug 2017.

◇ Slow Molecule Revolution: Time lower bounds for computation with chemical reaction networks.

Laboratoire de Recherche en Informatique, Université Paris-Sud, Jul 2017.

◇ “No we can’t”: Impossibility of efficient leader election by chemical reactions.

Workshop on advances in numerical and analytic approaches for the study of non-spatial stochastic dynamical systems in molecular biology, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, Apr 2016.

◇ Design of geometric molecular bonds, à la Reed-Solomon.

Workshop on Coding Techniques for Synthetic Biology, University of Illinois at Urbana-Champaign, Oct 2015.

◇ Programming with chemical kinetics.

Workshop on kinetic networks: From topology to design, Santa Fe Institute, Sept 2015.

◇ Computation by (not about) chemistry.

Workshop on mathematical trends in reaction network theory, University of Copenhagen, July 2015.

◇ Algorithmic self-assembly with DNA single-stranded tiles.

Genome Center Systems and Synthetic Biology Seminar Series, University of California–Davis, Feb 2015.

- ◇ Rate independent computation by mass-action chemistry.
48th Annual Asilomar Conference on Signals, Systems, and Computers, Asilomar, California, Nov 2014.
- ◇ (Tutorial) Agents and reagents: Distributed systems in a test tube. (with David Soloveichik)
DISC 2014: *28th International Symposium on DIStributed Computing*, Austin, Texas, Oct 2014.
- ◇ Deterministic function computation with chemical reaction networks.
CS Departmental Seminar, University of British Columbia, Sept 2012.
- ◇ Deterministic computation with chemical reaction networks.
CS Departmental Seminar, Aalto University, Helsinki, Finland, Jun 2012.
- ◇ (Tutorial) Theory of Algorithmic Self-Assembly with DNA Tiles
DNA 2011: *17th International Meeting on DNA Computing and Molecular Programming*, Pasadena, CA, Sept 2011.
- ◇ The state of algorithmic self-assembly at Iowa State.
FNANO 2010: *7th Conference on Foundations of Nanoscience*. Track on Principles and Theory of Self-Assembly, Apr 2010.
- ◇ Coevolution and non-local adaptation in gridplants.
Pioneer Hi-Bred Bioinformatics Group, Johnston, IA, Mar 2004.

GRANTS

- ◇ **Principal investigator**
 - *Kinetics and Thermodynamics of Chemical Computation*, \$250,000, National Science Foundation CISE/CCF/AF grant, 2016-2019, [NSF award #CCF-1619343](#)
 - *Theory of Molecular Programming: Computability and Complexity*, \$425,000, National Science Foundation CISE/CCF/AF grant, 2012-2015, (co-PI: Damien Woods), [NSF award #CCF-1219274](#)
- ◇ **Co-principal investigator**
 - *Student Travel Support for BIRS Workshop on Programming Chemical Reaction Networks*, \$5000, National Science Foundation CISE/CCF/AF grant, 2014, (PI: Lulu Qian, co-PIs: David Doty, Chris Thachuk), [NSF award #CCF-1442454](#)
 - *Scaling Up Programmable and Algorithmic DNA Self-Assembly*, \$400,000, National Science Foundation CISE/CCF/AF grant, 2012-2015, (PI: Erik Winfree, co-PIs: David Doty, Damien Woods), [NSF award #CCF-1162589](#)
 - *Future directions for molecular programming: DNA17 special session*, \$15,000, National Science Foundation, 2011, (PI: Erik Winfree, co-PIs: David Doty, Niles Pierce, Damien Woods), [NSF award #CCF-1143993](#)
 - *Student Travel Support for DNA17*, \$12,000, National Science Foundation, 2011, (PI: Erik Winfree, co-PIs: David Doty, Niles Pierce, Damien Woods), [NSF award #CCF-1137770](#)

STUDENTS
SUPERVISED

- ◇ **Ph.D.**
 - Mahsa Eftekhari, currently Ph.D. candidate in Computer Science, UC-Davis
 - David Haley, currently Ph.D. candidate in Applied Mathematics, UC-Davis
- ◇ **Master**
 - Amanda Belleville, M.S. in Computer Science, UC-Davis, 2017
now Software Application Engineer at [Workday](#)
 - Shaopeng Zhu, M.S. in Computer Science, UC-Davis, 2017
now Ph.D. student in Computer Science at [University of Maryland, College Park](#)
- ◇ **Undergraduate**

- Nicholas Schiefer, 2015, Caltech SURF (Summer undergraduate research fellowship), theory of algorithmic self-assembly/chemical reaction networks
- Aakash Indurkha, 2013, Caltech SURF (Summer undergraduate research fellowship), theory of computation with chemical reaction networks
- Felix Zhou, 2012, Caltech SURF (Summer undergraduate research fellowship), experiments with algorithmic self-assembly of DNA single-stranded tiles
- Nathaniel Bryans, 2010, University of Western Ontario summer research project, theory of algorithmic self-assembly

◇ **High school**

- Jupinder Parmar, currently working on project with theoretical algorithmic self-assembly.

◇ **Thesis/Qualifying exam committee**

- Thong Le, Qualifying exam, Ph.D. advisor: Dan Gusfield, UC-Davis, 2017
- Julia Matsieva, Qualifying exam, Ph.D. advisor: Dan Gusfield, UC-Davis, 2017
- Adam Rupe, Qualifying exam, Ph.D. advisor: James Crutchfield, UC-Davis, 2017
- Haochen Wu, Qualifying exam, Ph.D. advisor: Raissa D'Souza, UC-Davis, 2017
- Paul Riechers, Qualifying exam, Ph.D. advisor: James Crutchfield, UC-Davis, 2016
- Rafael Bravo, M.S. committee, Master's advisor: Jeffery Schank, UC-Davis, 2016

SERVICE

◇ **Program committee chair**

- **DNA 2018:** 24th Meeting on DNA Computing and Molecular Programming

◇ **Program committee member**

- **OPODIS 2017:** 21st International Conference on Principles of Distributed Systems
- **DISC 2017:** 29th International Symposium on DIStributed Computing
- **DNA 2017:** 23rd Meeting on DNA Computing and Molecular Programming
- **DNA 2016:** 22nd Meeting on DNA Computing and Molecular Programming
- **CiE 2016:** 12th Computability in Europe Conference
- **DNA 2015:** 21st Meeting on DNA Computing and Molecular Programming
- **UCNC 2015:** 14th Conference on Unconventional Computation/Natural Computation
- **DNA 2014:** 20th Meeting on DNA Computing and Molecular Programming
- **DNA 2012:** 18th Meeting on DNA Computing and Molecular Programming
- **UCNC 2012:** 11th Conference on Unconventional Computation/Natural Computation
- **DNA 2011:** 17th Meeting on DNA Computing and Molecular Programming

◇ **Workshop chair**

- Minisymposium on Algorithmic Chemical Reaction Networks, at **CanaDAM 2015:** 5th Canadian Discrete and Algorithmic Mathematics Conference

◇ **Organizing committee**

- [Programming with Chemical Reaction Networks: Mathematical Foundations](#), 2014 Workshop at Banff International Research Station for Mathematical Innovation and Discovery
- **DNA 2011:** 17th Meeting on DNA Computing and Molecular Programming

- ◇ **Conference reviewer:** DNA: *DNA Computing and Molecular Programming*, STOC: *ACM Symposium on Theory of Computing*, FOCS: *IEEE Symposium on Foundations of Computer Science*, SODA: *ACM-SIAM Symposium on Discrete Algorithms*, PODC: *ACM Symposium on Principles of Distributed Computing*, ICALP: *International Colloquium on Automata, Languages, and Programming*, ESA: *European Symposium on Algorithms*, SPAA: *ACM Symposium on Parallelism in Algorithms and Architectures*, CCC: *International Conference on Computational Complexity*, STACS: *International Symposium on Theoretical Aspects of Computer*

Science, *POPL: Principles of Programming Languages*, *ISAAC: International Symposium on Algorithms and Computation*, *CiE: Computability in Europe*, *RECOMB: Research in Computational Molecular Biology*, *CSMB: International Conference on Computational Methods in Systems Biology*

◇ **Journal referee:** *Nature Communications*, *CACM: Communications of the ACM*, *SICOMP: SIAM Journal on Computing*, *PLOS ONE*, *Journal of the Royal Society: Interface*, *JoVE: Journal of Visualized Experiments*, *DIST: Distributed Computing, Algorithmica*, *I&C: Information and Computation*, *IPL: Information Processing Letters*, *TCS: Theoretical Computer Science*, *ToCS: Theory of Computing Systems*, *JCB: Journal of Computational Biology*, *NaCo: Natural Computing*, *IEEE Transactions on NanoBioscience*, *International Journal of Computer Mathematics*, *Mathematics and Computers in Simulation*, *BioSystems*, *IET Nanobiotechnology*, *Information*, *Chaos*, *Advanced Science Letters*

◇ **National Science Foundation panelist:** 2013, 2017

◇ **University service:**

- University of California, Davis:
 - Undergraduate affairs, Computer Science, 2017-present
 - Faculty liason to CS Club, 2017-present
 - Faculty search, Computer Science, 2017
 - Graduate admissions, Computer Science, 2016, 2018
- California Institute of Technology:
 - Graduate admissions, Computer Science, 2013, 2014

◇ **Media:** Video introducing algorithmic self-assembly to a (mostly) lay audience, made to accompany a review article on the same subject: <https://vimeo.com/54214122>

◇ **Interviews:**

- Machine Intelligence Research Institute: Luke Muehlhauser, on algorithmic self-assembly <http://intelligence.org/2014/04/23/dave-doty/>

◇ **Outreach:**

- Story consultant for *Isa*, made-for-TV movie on *SyFy*, 2014 (main character is a gifted Latina high school student interested in computer science and mathematics)
- Judge for 2013 Caltech SURF (Summer Undergraduate Research Fellowship) poster competition
- Speaker and discussion leader at [2012 Siemens Competition in Math, Science, and Technology](#)
- Hosted Pasadena high school biology students in lab for educational seminar about careers in science

◇ **Professional memberships**

- International Society for Nanoscale Science, Computation, and Engineering (ISNSCE)
- Association for Computing Machinery (ACM), Special Interest Group in Algorithms and Computation Theory (SIGACT)

TEACHING
EXPERIENCE

◇ **Instructor**, University of California, Davis (as faculty), Fall 2015 – present

- Theory of Computation (graduate)
- Theory of Computation (undergraduate)
- Theory of Molecular Computation (graduate)
- Developed software to support grading and feedback:

- **Simulators for Theory of Computing:** Web applications for simulating deterministic and nondeterministic finite automata, regular expressions, context-free grammars, and Turing machines. They are used by my Theory of Computation students for creating and testing automata to submit for homework. In conjunction with Gradescope (<https://gradescope.com/>), this enables automated grading of homework, with immediate feedback to the students to enable them to learn and improve immediately.
<http://web.cs.ucdavis.edu/~doty/automata/>

- ◇ **Instructor**, Iowa State University (as a Ph.D. student), Summer 2006 – Spring 2009
 - Theory of Computation (undergraduate)
 - Introduction to Object-Oriented Programming in Java
 - Data Structures in Java
 - Programming for non-CS-majors in Java
- ◇ **Graduate teaching assistant**, Iowa State University, Summer 2001, Spring 2002, Fall 2004 – Spring 2005, Summer 2007
 - Introduction to Circuits for non-EE-majors
 - System Modeling, Simulation, and Optimization
 - Programming for non-majors in Java
 - Introduction to Object-oriented Programming in Java
 - Data Structures in Java
- ◇ **Developed course materials** for introductory programming and data structures courses on a grant from Caterpillar, Inc. during Summer 2005, Iowa State University
- ◇ **Tutor**, Iowa State University, Spring 1999, Spring 2000
 - Classical Physics
 - Introduction to Digital Design
 - Algorithm Design and Analysis