

DAVID F. ANDERSON

Vilas Distinguished Achievement Professor of Mathematics

August 17, 2024

Department of Mathematics
University of Wisconsin - Madison
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Current Appointments

2018 -	Vilas Distinguished Achievement Professor	University of Wisconsin, Mathematics Department
2017 -	Professor	University of Wisconsin, Mathematics Department
2013 -	Fellow	Wisconsin Institute for Discover – systems biology

Previous Appointments

2015 - 2017	Associate Professor	University of Wisconsin, Mathematics Department
2009 - 2015	Assistant Professor	University of Wisconsin, Mathematics Department
2007 - 2009	Postdoc	University of Wisconsin, Mathematics Department
2005 - 2006	Postdoc	Duke University, Mathematics Department

Education

2005	Ph.D.	Duke University, Mathematics Department advisors: Michael C. Reed and Jonathan C. Mattingly
2001	M.A.	Duke University, Mathematics Department
2000	B.A.	University of Virginia, Mathematics Department
1996		Bridgewater-Raynham Regional High School

Research grants (all single P.I.)

2021 – 2024	National Science Foundation, DMS-2051498 (\$270,000) <i>Reaction networks: Theory, Computation, and Applications.</i>
2022 – 2023	ROA add on to above NSF grant with Badal Joshi (Cal State San Marcos): \$93,058
2018 – 2021	US Army Research Office, Biomathematics, grant W911NF-18-1-0324 (\$411,491) <i>Analytical and computational methods for biological interaction systems.</i>
2018 – 2021	National Science Foundation (\$216,000) <i>Emergent Properties of Biological Interaction Systems.</i> (Turned down by PI due to overlap with ARO grant)
2014 – 2017	US Army Research Office, Biomathematics, grant W911NF-14-1-0401 (\$259,972) <i>Analysis of stochastic models of biochemical reaction networks.</i>
2013 – 2017	NSF research grant DMS-1318832 (\$249,999) <i>Computational methods for stochastic models of biochemical reaction networks.</i>
2010 – 2013	NSF research grant DMS-1009275 (\$180,000) <i>Stochastic and deterministic models of intracellular reaction networks: analysis and algorithms.</i>

Major awards

- 2022 Named a Simons Fellow.
- 2018 Appointed Vilas Distinguished Achievement Professor at UW-Madison.
- 2016 *Vilas Associates Award* from UW-Madison.
- 2014 Inaugural recipient of *The IMA Prize in Mathematics and its Applications*.
Description of prize: Awarded annually to a mathematical scientist who received his/her PhD degree within 10 years of the nomination year. This award recognizes an individual who has made a transformative impact on the mathematical sciences and their applications.

Other honors and awards

- 2017 & 2010 University Housing Honored Instructor, UW-Madison.
- Spring 2016 Invited as Simons Fellow to Isaac Newton Institute, Cambridge University, UK.
- Sept. 2015 Plenary Lecture (1 of 7) at SciCADE 2015, Potsdam, Germany.
- 2013 – Fellow of the Wisconsin Institute for Discovery.
- 2004 L.P. and Barbara Smith Award for Teaching Excellence, Duke University.
- 2000 E.J. McShane Prize in Mathematics, University of Virginia Mathematics.

Books

1. David F. Anderson, Timo Seppäläinen, and Benedek Valkó, *Introduction to Probability*, University of Cambridge Press, 2017.
2. David F. Anderson and Thomas G. Kurtz, *Stochastic Analysis of Biochemical Systems*, Springer, 2015.

Research publications (all available on [arXiv.org](https://arxiv.org) and my departmental webpage)

1. David F. Anderson and Aidan S. Howells, *Parametric Sensitivity Analysis for Models of Reaction Networks within Interacting Compartments*, submitted, 2024.
2. David F. Anderson and Badal Joshi, *Chemical mass-action systems as analog computers: implementing arithmetic computations at specified speed*, submitted, 2024.
3. David F. Anderson, Daniele Cappelletti, Wai-Tong Louis Fan, and Jinsu Kim, *A new path method for exponential ergodicity of Markov processes on \mathbb{Z}^d , with applications to stochastic reaction networks*, submitted, 2023.
4. David F. Anderson and Aidan S. Howells, *Stochastic reaction networks within interacting compartments*, Bulletin of Mathematical Biology, Volume 85, number 87, 2023.
5. David F. Anderson and Jinsu Kim, *Mixing times for two classes of stochastically modeled reaction networks*, Mathematical Biosciences and Engineering, Vol. 20, Issue 3, 4690-4713, 2023.
6. David F. Anderson and Tung Nguyen, *Prevalence of deficiency zero reaction networks in an Erdős-Rényi framework*, Journal of Applied Probability, Vol 59, issue 2, 384-398, 2022.
7. David F. Anderson and Kurt W. Ehlert, *Conditional Monte Carlo for reaction networks*, SIAM J. Sci. Comput., Volume 44, No. 2, A993-A1019, 2022.
8. David F. Anderson and Tung D. Nguyen, *Deficiency zero for random reaction networks under a stochastic block model framework*, Journal of Mathematical Chemistry, Volume 59, 2063-2097, 2021.

9. David F. Anderson, Badal Joshi, and Abhishek Deshpande, *On reaction network implementations of neural networks*, Royal Society Interface, Vol. 18, 20210031, 2021.
10. David F. Anderson, James D. Brunner, Gheorghe Craciun, and Matthew D. Johnston, *On classes of reaction networks and their associated polynomial dynamical systems*, Volume 58, 1895 - 1925, Journal of Mathematical Chemistry, 2020.
11. David F. Anderson and Chaojie Yuan, *Variance of finite difference methods for reaction networks with non-Lipschitz rate functions*, Volume 58, Number 6, 3125-3143, SIAM Journal on Numerical Analysis, 2020.
12. David F. Anderson, Daniele Cappelletti, Jinsu Kim, and Tung Nguyen, *Tier structure of strongly endotactic reaction networks*, Stochastic Processes and their Applications, Volume 130, Issue 12, 7218-7259, 2020.
13. David F. Anderson, Daniele Cappelletti, and Jinsu Kim, *Stochastically modeled weakly reversible reaction networks with a single linkage class*, Journal of Applied Probability, Vol. 57, Issue 3, 792-810, 2020.
14. David F. Anderson, David Schnoerr, and Chaojie Yuan, *Time-dependent product-form Poisson distributions for reaction networks with higher order complexes*, Journal of Mathematical Biology, Volume 80, 1919-1951, 2020.
15. David F. Anderson, Daniele Cappelletti, Andrés Ortiz-Muñoz, and Erik Winfree, *Stochastic chemical reaction networks for robustly approximating arbitrary probability distributions*, Theoretical Computer Science, Vol. 801, 64-95, 2020.
16. David F. Anderson and Daniele Cappelletti, *Discrepancies between extinction events and boundary equilibria in reaction networks*, Journal of Mathematical Biology, Vol. 79, Issue 4, 1253 - 1277, 2019.
17. David F. Anderson and Tung D. Nguyen, *Results on stochastic reaction networks with non-mass action kinetics*, Mathematical Biosciences and Engineering, Vol. 16, Issue 4, 2118-2140, 2019.
18. David F. Anderson and Chaojie Yuan, *Low variance couplings for stochastic models of intracellular processes with time-dependent rate functions*, Bulletin of Mathematical Biology, Vol. 81, Issue 8, 2902 - 2930, 2019.
19. David F. Anderson, Desmond J. Higham, Saul C. Leite, and Ruth J. Williams, *On constrained Langevin Equations and (Bio)Chemical Reaction Networks*, SIAM Multiscale Modeling & Simulation, Vol. 17, No. 1, 2019.
20. David F. Anderson and Jinsu Kim, *Some network conditions for positive recurrence of stochastically modeled reaction networks*, SIAM Applied Math, Vol. 78, Issue 5, 2692-2713, 2018.
21. David F. Anderson, Daniele Cappelletti, Masanori Koyama, and Thomas G. Kurtz, *Non-explosivity of stochastically modeled reaction networks that are complex balanced*, Bulletin of Mathematical Biology, Vol. 80, Issue 10, 2561-2579, 2018.
22. David F. Anderson, Desmond J. Higham, and Yu Sun, *Computational complexity analysis for Monte Carlo approximations of classically scaled population processes*, SIAM Multiscale Modeling & Simulation, Vol. 16, No. 3, pp. 1206-1226, 2018.
23. David F. Anderson, Radek Erban, Tomislav Plesa, and Konstantinos C. Zygalakis, *Noise control for molecular computing*, Journal of the Royal Society Interface, Vol. 15, No. 144, 2018.
24. David F. Anderson, Robert Brijder, Gheorghe Craciun, and Matthew D. Johnston, *Conditions for extinction events in chemical reaction networks with discrete state spaces*, Journal of Mathematical Biology, Vol. 76, Issue 6, 1535 - 1558, 2018.

25. David F. Anderson, Daniele Cappelletti, and Thomas G. Kurtz, *Finite time distributions of stochastically modeled chemical systems with absolute concentration robustness*, SIAM Applied Dynamical Systems, Vol. 16, No. 3, 1309 - 1339, 2017.
26. Nataliya G. Batina, Christopher J. Crnich, David F. Anderson, and Dörte D.V. Döpfer, *Identifying Conditions for Elimination and Epidemic Potential of Methicillin-resistant Staphylococcus aureus in Nursing Homes*, Antimicrobial Resistance & Infection Control, Vol. 5, Issue 32, 2016.
27. David F. Anderson and Simon L. Cotter, *Product-form stationary distributions for deficiency zero networks with non-mass action kinetics*, Bulletin of Mathematical Biology, Vol. 78, Issue 12, 2390-2407, 2016.
28. David F. Anderson, Joke Blom, Michel Mandjes, Halldora Thorsdottir, and Koen De Turck, *A functional central limit theorem for a Markov-modulated infinite-server queue*, Methodology and Computing in Applied Probability, Vol. 18, Issue 1, 153-168, 2016.
29. Nataliya G. Batina, Christopher J. Crnich, David F. Anderson, and Dörte D.V. Döpfer, *Models to Predict Prevalence and Transition Dynamics of Methicillin-resistant Staphylococcus aureus in Community Nursing Homes*, American Journal of Infection Control, Vol. 44, No. 5, 507 - 514, 2016.
30. David F. Anderson, Desmond J. Higham, and Yu Sun, *Multilevel Monte Carlo for stochastic differential equations with small noise*, SIAM Journal on Numerical Analysis, Vol. 54, No. 2, 505-529, 2016.
31. David F. Anderson, Gheorghe Craciun, Manoj Gopalkrishnan, and Carsten Wiuf, *Lyapunov functions, stationary distributions, and non-equilibrium potential for reaction networks*, Bulletin of Mathematical Biology, Vol. 77, Issue 9, 1744-1767, 2015.
32. David F. Anderson and Elizabeth Skubak Wolf, *Hybrid pathwise sensitivity methods for discrete stochastic models of chemical reaction systems*, Journal of Chemical Physics, **142**, 034103, 2015.
33. David F. Anderson and Masanori Koyama, *An asymptotic relationship between coupling methods for stochastically modeled population processes*, IMA Journal of Numerical Analysis, Vol. 35, No. 4, 1757 - 1778, 2015.
34. David F. Anderson, Bard Ermentrout, and Peter J. Thomas, *Stochastic Representations of Ion Channel Kinetics and Exact Stochastic Simulation of Neuronal Dynamics*, Journal of Computational Neuroscience, Vol. 38, Issue 1, 67-82, 2015.
35. David F. Anderson, Desmond J. Higham, and Yu Sun, *Complexity of Multilevel Monte Carlo Tau-Leaping*, SIAM Journal of Numerical Analysis, Vol. 52, Issue 6, 3106-3127, 2014.
36. David F. Anderson, Germán Enciso, and Matthew D. Johnston, *Stochastic analysis of biochemical reaction networks with absolute concentration robustness*, Journal of the Royal Society Interface, **11**, 20130943, February, 2014.
37. Rishi Srivastava, David F. Anderson, and James B. Rawlings, *Comparison of finite difference based methods to obtain sensitivities of stochastic chemical kinetic models*, Journal of Chemical Physics, **138**(7), 074110, 2013.
38. David F. Anderson and Elizabeth Skubak Wolf, *A finite difference method for estimating second order parameter sensitivities of discrete stochastic chemical reaction networks*, Journal of Chemical Physics, **137**(22), 224112, 2012.
39. David F. Anderson, *An efficient finite difference method for parameter sensitivities of continuous time Markov chains*, SIAM Journal on Numerical Analysis, **50**(5), 2237 - 2258, 2012.

40. David F. Anderson and Masanori Koyama, *Weak error analysis of numerical methods for stochastic models of population processes*, SIAM: Multiscale Modeling and Simulation, **10**(4), 1493 - 1524, 2012.
41. David F. Anderson and Desmond J. Higham, *Multilevel Monte Carlo for continuous time Markov chains, with applications in biochemical kinetics*, SIAM: Multiscale Modeling and Simulation, **10**(1), 146 - 179, 2012.
42. David F. Anderson, *A proof of the Global Attractor Conjecture in the single linkage class case*, SIAM J. Appl. Math., **71**(4), 2011.
43. David F. Anderson, *Boundedness of trajectories for weakly reversible, single linkage class reaction systems*, Journal of Mathematical Chemistry, **49**(10), 2275-2290, 2011.
44. David F. Anderson and Jonathan C. Mattingly, *A weak trapezoidal method for a class of stochastic differential equations*, Communications in Mathematical Sciences, **9**(1), 301 - 318, March 2011.
45. David F. Anderson, Arnab Ganguly, and Thomas G. Kurtz, *Error Analysis of the tau-leap simulation method for stochastically modeled chemical reaction systems*, Annals of Applied Probability, **21**(6), 2226 - 2262, 2011.
46. David F. Anderson, Gheorghe Craciun, and Thomas G. Kurtz, *Product-form stationary distributions for deficiency zero chemical reaction networks*, Bulletin of Mathematical Biology, **72**, 1947 - 1970, 2010.
47. David F. Anderson and Anne Shiu, *The dynamics of weakly reversible population processes near facets*, SIAM J. Appl. Math, **70**(6), 1840 - 1858, January 2010.
48. David F. Anderson, *Global asymptotic stability for a class of nonlinear chemical equations*, Siam J. Appl. Math., **68**(5), 1464 - 1476, May 2008.
49. David F. Anderson, *Incorporating postleap checks in tau-leaping*, Journal of Chemical Physics, **128**(5), 054103, Feb. 2008.
50. David F. Anderson, *A modified Next Reaction Method for simulating systems with time varying rate constants and systems with delays*, Journal of Chemical Physics, **127**(21), 214107, Dec. 2007.
51. David F. Anderson and Jonathan C. Mattingly, *Propagation of Fluctuations in Biochemical Reaction Systems, II: Nonlinear Chains*, IET Systems Biology, **1**(6), 313 - 325, Nov. 2007.
52. David F. Anderson, Jonathan C. Mattingly, H. Frederik Nijhout, Michael Reed, *Propagation of Fluctuations in Biochemical Systems, I: Linear SSC Networks*, Bulletin of Mathematical Biology, **69**(6), 1791 - 1813, Aug. 2007.
53. H. Frederik Nijhout, Michael C. Reed, David F. Anderson, Jonathan C. Mattingly, S. Jill James, and Cornelia M. Ulrich, *Long-Range Allosteric Interactions between the Folate and Methionine Cycles Stabilize DNA Methylation Reaction Rate*, Epigenetics, **1**(2), 81 - 87, April/May 2006.
54. David F. Anderson, *Stochastic Perturbations of Biochemical Reaction Systems*, PhD Thesis, Duke University Mathematics Department, Aug. 2005.

Book chapters

1. David F. Anderson and Thomas G. Kurtz, *Continuous time Markov chain models for chemical reaction networks*, chapter in Design and Analysis of Biomolecular Circuits: Engineering Approaches to Systems and Synthetic Biology, H. Koepl et al. (eds.), Springer, 2011.

Books in progress

1. David F. Anderson, *Lecture Notes on Stochastic Processes with Applications in Biology*, 216 pages, 2015.

Invited colloquia, seminars, and conference talks

1. 2024. [Seminar on the Mathematics of Reaction Networks](#). April, 25th.
2. 2023. Institute for Basic Science (IBS) Biomedical Mathematics Online Colloquium, Korea. October 20th.
3. 2022. Summer school, University of Turin, Italy. July 10th-July 15th.
4. 2022. Colloquium. University of Wisconsin-Madison. March 11th.
5. 2021. Plenary for Frontier Probability Days. (Postponed due to Covid until December, 2021)
6. 2021. Society of Mathematical Biology annual meeting (virtual conference). June 17th, 2021.
7. 2021. SIAM Applications of Dynamical Systems (virtual conference). May 23rd-27th.
8. 2021. Plenary for 2nd International Conference on Reaction Kinetics, Mechanisms and Catalysis, Budapest, Hungary (virtual). May 20th.
9. 2021. Plenary for [Conference on New Developments in Probability](#) (virtual). May 12th-14th.
10. 2021. Colloquium, New Jersey Institute of Technology (virtual). April 9th.
11. 2020. [Seminar on the Mathematics of Reaction Networks](#). Inaugural lecture (virtual). November 12th.
12. 2019. Harvard. *Workshop on Dynamics, Randomness, and Control in Molecular and Cellular Networks*. November 13.
13. 2019. Society for Mathematical Biology, University of Montreal, Canada. July 25th.
14. 2019. Colloquium, University of Massachusetts - Amherst. March 4th.
15. 2018. Colloquium, University of Pennsylvania Mathematics. November 28th.
16. 2018. Erwin Schrödinger Institute, Vienna, workshop on “Advances in Chemical Reaction Network Theory”. October 15-19.
17. 2018. SIAM Life Sciences. August 5 - 9.
18. 2018. Workshop on “Kinetic Models with Applications in the Natural Sciences”. April 29-May 2.
19. 2017. Workshop on Mathematical Analysis of Biological Interaction Networks, Banff International Research Stations. June 5th - 9th.
20. 2017. Probability seminar at Tulane University. March 22nd.
21. 2017. Mathematical Biology Seminar at Arizona State. February 17th.
22. 2016. SIAM Life Sciences, Boston, Massachusetts. July 11th-14th.
23. 2016. University of Bath, Math-Biology. May 16th.
24. 2016. University of Strathclyde, SIAM student chapter. May 3rd.
25. 2016. Imperial College London, Biomathematics Seminar. April 26th.
26. 2016. Oxford University. Math-biology seminar. February 5th, 2016.
27. 2016. Isaac Newton Institute at the University of Cambridge. January 19th.

28. 2015. Joint mathematics colloquium and Life Science seminar, Case Western Reserve University, Nov. 9th.
29. 2015. AMS Section Meeting, Chicago IL. October 3-4.
30. 2015. Plenary talk (1 of 7) at SciCADE (International Conference on Scientific Computation And Differential Equations), Potsdam, Germany. Sept. 14th - 18th.
31. 2015. Workshop on Mathematical Trends in Reaction Network Theory, University of Copenhagen, July 3rd.
32. 2015. Duke University, Mathematical Biology seminar. April 17.
33. 2015. Duke University, probability seminar. April 16.
34. 2014. *MBI (Mathematical Biosciences Institute) Conference for Young Researchers*, Aug. 25th - 28th.
35. 2014. (Plenary) *Stochastic Networks 2014*, CWI and the University of Amsterdam, June 23rd - 27th.
36. 2014. *Programming with Chemical Reaction Networks*, BIRS, Banff, Canada. June 8th - 13th.
37. 2014. University of Utah Math-Biology Seminar. January 15th.
38. 2013. Boston University Statistics and Probability Seminar. November, 21st.
39. 2013. Colloquium, U. of South Carolina, Statistics Department. October 3rd.
40. 2013. *Evolutionary Systems Biology*, BIRS, Banff, Canada. May 27th - 31st.
41. 2013. IMA (Institute for Mathematics and its Applications) workshop on *Stochastic modeling of biological processes*. May 13 - 17th.
42. 2013. AMS Sectional meeting in Ames, Iowa. Minisymposium. April 27th.
43. 2013. Colloquium, U. of Wisconsin Milwaukee, Mathematics Department. February 8th.
44. 2013. Colloquium. U. of Arizona, Applied Mathematics Department. January 18th.
45. 2012. (Plenary) CWI (Amsterdam) conference on *Stochastics and nonlinear dynamics in the life sciences*. November 15th.
46. 2012. Colloquium, University of Amsterdam, Mathematics Department. November 14th.
47. 2012. University of Illinois, probability seminar. August 28th.
48. 2012. Invited tutorial at SIAM Life Sciences conference, San Diego, California. August 7th - 10th.
49. 2012. SIAM Life Sciences, San Diego, California. Minisymposium. August 7th - 10th.
50. 2012. Invited lecturer at Joint 2012 MBI-NIMBioS-CAMBAM Summer Graduate Workshop on *Stochastics Applied to Biological Systems*. June 18-29.
51. 2012. MCQMC (Monte Carlo and Quasi-Monte Carlo), Sydney, Australia. Minisymposium. Feb. 17th.
52. 2012. Penn State, seminar on probability and its applications. January 13th.
53. 2011. Mathematical Biosciences Institute (MBI) workshop: *Stochastic Processes in Cell and Population Biology*, Columbus, Ohio. Oct. 24th - 28th.
54. 2011. SIAM Conference on Applied Algebraic Geometry, Raleigh, NC. Minisymposium. October 6 - 9th.
55. 2011. First OMI and OCCAM Joint Workshop, Oxford University, 8th-10th August.

56. 2011. (Plenary) Conference on Stochastic Systems Biology. Monté Verita Switzerland (hosted by ETH Zurich), July 20th - 22nd.
57. 2011. Simon Fraser University applied math seminar. April 1st.
58. 2011. Conference: Computational and Systems Biology. U. of Florida, March 17th - 19th.
59. 2011. University of Illinois mathematical Biology seminar. Feb. 24th.
60. 2011. Colloquium, Virginia Tech, Mathematics department. February 11th.
61. 2010. AMS 2010 Fall Central Section Meeting, Notre Dame. Minisymposium. November 5-7.
62. 2010. Colloquium, U. of Maryland at Baltimore County, math department. Sept. 10th.
63. 2010. SIAM Annual Meeting and conference on the Life Sciences, Pittsburgh, Pa. Minisymposium. July 15th.
64. 2010. SIAM: Emerging Topics in Dynamical Systems and Partial Differential Equations, Barcelona, Spain. Minisymposium 1. June 4th.
65. 2010. SIAM: Emerging Topics in Dynamical Systems and Partial Differential Equations, Barcelona, Spain. Minisymposium 2. June 3rd, 2010.
66. 2010. (Plenary) Stochastic Networks Conference, Newton Institute, Cambridge, UK., March 22-26.
67. 2009. SAMSI, *Stochastic Dynamics*. SAMSI, North Carolina. August 30th – September 2nd.
68. 2009. Max Planck Institute, seminar on math biology. Magdeburg, Germany. July 29th.
69. 2009. Stochastic Processes and their Applications, Berlin. Minisymposium. July 27 - 31.
70. 2009. Workshop on Control Theory and Dynamics in Systems Biology, DIMACS, Rutgers, May 18 - 22.
71. 2009. Colloquium, NC State University, Department of Mathematics. January 21.
72. 2009. Colloquium. Michigan State University, Department of Mathematics, January 16.
73. 2009. Colloquium, McGill University, Department of Mathematics. January 12.
74. 2009. The Ohio State University, Department of Mathematics and the Mathematical Biosciences Institute. January 7.
75. 2008. Colloquium, UW - Madison, Department of Mathematics. December 12.
76. 2008. Workshop on Discrete Models in Systems Biology, Statistical and Applied Mathematical Sciences Institute (SAMSI) in Research Triangle Park, NC, USA, December 3-5.
77. 2008. Mathematical and Computational Models in Biological Networks, Mathematical Biosciences Institute (MBI), October 20-24.
78. 2008. SIAM Conference on the Life Sciences, Montreal, Canada, Aug. 4th.
79. 2008. Workshop on Protein Folding, Institute for Mathematics and its Applications (IMA), Minneapolis, Mn., January 14-18.
80. 2007. Workshop on the practice and theory of stochastic simulation, American Institute of Mathematics (AIM), Palo Alto, Ca., October.
81. 2007. Applications of Analysis to Mathematical Biology: A conference in honor of the 65th birthday of Michael C. Reed, Duke University, May 21 - 23.
82. 2006. Probability seminar, University of Wisconsin - Madison, Nov. 16.
83. 2006. Probability and Differential Equations joint seminar, North Carolina State University, Raleigh, NC., October 16.

84. 2005. Workshop on Applications of Methods of Stochastic Systems and Statistical Physics in Biology, University of Notre Dame, October.

Campus and departmental talks in Madison

1. 2016. Qbio seminar. Wisconsin Institute for Discovery. Oct. 26.
2. 2014. SysBioM Seminar, Wisconsin Institute for Discovery, University of Wisconsin at Madison. April 29th.
3. 2013. UW-Madison Probability Seminar. Sept. 26th.
4. 2012. Evolutionary Systems Biology, Madison, WI. July 30th - August 1st.
5. 2011. UW-Madison Statistics seminar. Dec. 7th.
6. 2011. UW-Madison probability seminar. Nov. 10th.
7. 2011. MATH BIO 3: MODELING, Wisconsin Institute for Discovery, Madison, Wi. September 30th.
8. 2010. Computation and Informatics in Biology and Medicine (CIBM) seminar, Madison, Dec. 7th.
9. 2010. Seminar on Computational and Mathematical Methods in Science and Engineering (CMMSE), Madison. May 25th.
10. 2010. Seminar in BACTER Institute, UW-Madison. April 27th.
11. 2009. UW-Madison probability seminar. September 10th.
12. 2008. Applied Math seminar, University of Wisconsin - Madison, October 15th.
13. 2008. 2nd annual graduate probability conference at UW - Wisconsin, Madison, March 4.
14. 2008. Probability seminar, University of Wisconsin - Madison, March 13.
15. 2007. Probability seminar, University of Wisconsin - Madison, September 6.

Conferences and minisymposia organized

- 2019 AMS Sectional minisymposium, Sept. 14 - 15.
- 2019 Minisymposium at SMB in Montreal, July 21 - 26.
- 2018 2nd Madison Workshop on Mathematics of Reaction Networks, August 11-13.
- 2018 SIAM Conference on Life Sciences minisymposium titled *Stochastic models for biological reaction networks*. August 5 - 9.
- 2017 Mathematical Analysis of Biological Interaction Networks,
Banff International Research Station, Banff, Canada, June 4th - June 9th (Lead organizer)
- 2016 Advances in numerical and analytic approaches for the study of non-spatial stochastic dynamical systems in molecular biology, Isaac Newton Institute, Cambridge University, April 4th - 8th, 2016. (Chair of organizing committee.)
- 2015 1st Madison Workshop on Mathematics of Reaction Networks, October 5-7.
- 2014 Seminar on Stochastic Processes, portion on New Researchers in Probability. UC San Diego, March 26th - 29th, 2014. (Chair of committee.)
- 2013 Seminar on Stochastic Processes, portion on New Researchers in Probability. Duke University, March 13th - 16th, 2014. (Chair of committee.)
- 2012 SIAM Conference on Life Sciences minisymposium.
- 2012 14th Meeting of New Researchers in Statistics and Probability. U. of California, San Diego, July 26th - 28th. (Member of committee.)
- 2010 SIAM Conference on Life Sciences minisymposium.

Mentoring

Graduate students supervised

Aidan Howells,	Ph.D. 2024
Tung Nguyen,	Ph.D. 2021
Chaojie Yuan,	Ph.D. 2020
Kurt Ehlert,	Ph.D. 2019
Jinsu Kim,	Ph.D. 2018
Yu Sun,	Ph.D. 2015
Elizabeth Skubak Wolf,	Ph.D. 2014
Masanori Koyama,	Ph.D. 2013

Postdocs supervised

Daniele Cappelletti,	2016 - 2018	Now a professor at the University of Turin, Italy.
Matthew Johnston,	2012 - 2015	Now a professor at Lawrence Technological University

Undergraduate research supervised

Sean Greene,	Fall, 2014
Group project through the Madison Experimental Mathematics (MXM) program	Fall, 2024

Major service to the department

- 2017 – 2022 Director of Undergraduate Studies.

Service to the profession

- 2019 – 2022 Associate Editor for SIAM Applied Math.
- 2016 – 2021 Associate Editor for SIAM Review.
- 2013 – 2018 Associate Editor for Annals of Applied Probability.
- 2014 – 2018 Associate Editor for Communications in Mathematical Sciences.
- 2012 – 2013 Chair of IMS (Institute of Mathematical Statistics) subcommittee for the New Researchers in Probability Conference. (We plan the “new researchers” portion of the annual Seminar on Stochastic Processes.)
- 2011 – 2014 Member of IMS Committee on New Researchers. (We plan the yearly New Researchers in Statistics and Probability conference.)
- 2012 – present Co-organizer of the probability seminar at UW - Madison.
- 2014 – present Co-creator and co-organizer of Networks Seminar at UW - Madison.

Regular grant reviewer for NSF (both in math and bio directorates) and the Army Research Office.

Reviewer for myriad journals:

Annals of Applied Probability	Annals of Applied Statistics
Communications in Mathematical Sciences	SIAM Journal on Applied Mathematics
SIAM Applied Dynamical Systems	SIAM Journal on Mathematical Analysis
SIAM: Multiscale Modeling and Simulation	SIAM Journal on Scientific Computing
Stochastics	Mathematical Biosciences
Mathematical Biosciences and Engineering	Journal of Chemical Physics
Journal of Computational Physics	IEEE Transactions on Automatic Control
IEEE Transactions on Circuits and Systems I	IEE Proceedings Systems Biology
IMA Journal on Numerical Analysis	Computers and Mathematics with Applications
Stochastic Processes & Their Applications	

Major outreach activities

- 2011 – present Master of Ceremonies for the yearly Wisconsin MegaMath Meet.

Each spring, our department hosts a competition for several hundred 5th and 6th graders from communities around Madison and southern Wisconsin. Student teams arrive at the Math Department in the morning with their teachers and parent chaperones. They work in teams on a set of often unusual but always interesting and accessible math problems, and there is also a test where students compete as individuals. At the end of the session, the winners of the individual and team competitions are announced and awarded trophies. Together with a team of graduate students, I help develop and finalize the content of the meet. I then serve as the master of ceremonies for the event.

Professional societies

Institute for Mathematical Statistics (IMS), Society for Mathematical Biology (SMB), Society for Industrial and Applied Mathematics (SIAM), American Women in Mathematics (AWM).

Curriculum development

1. Wrote a pretty good book for Math 431, Introduction to Probability, that is now used widely.

2. Developed **Math 605: Stochastic Methods in Biology**, UW - Madison. This course is an introduction to stochastic processes, with applications to biology. It covers discrete and continuous time Markov chains, renewal processes, and diffusion processes. Numerical simulation is a key component of the course. I also wrote a textbook for this course.
3. Developed **laboratory style group projects** for Calculus I. The students work in groups of three or four and discover a key concept such as limits or the convergence of Riemann sums. Each group then writes a single report on the project. Three or four such projects are assigned throughout the semester. The goal is to get students to be able to coherently write mathematics at an earlier stage in their careers. All UW-Madison students taking the regular calculus sequence now participate in these projects.