

Dr. Lora Billings
Professor Applied Mathematics
May 2020

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EDUCATION

PhD	Applied Mathematics	University of Colorado, Boulder	1998
MS	Applied Mathematics	University of Colorado, Boulder	1996
BS	Mathematics	Lafayette College	1993

PROFESSIONAL EXPERIENCE

Dean, College of Science and Mathematics July 2018 – present
Montclair State University

As administrative head of the College, I manage the operations of all departments, faculty members, staff and other employees, develop the budget, and manage finance, facilities, enrollment, fundraising, technology, communications, marketing, international, and alumni and community relations. I work with the Advisory Board, faculty, staff and stakeholders to set the strategic vision for the College, communicate the vision to all internal and external constituencies, and secure the needed resources to accomplish the strategic goals that drive degree programs, student success, faculty recruiting and development, research advancement, community engagement and development.

Acting Dean, College of Science and Mathematics July 2017 – June 2018
Montclair State University

Oversaw a critical transition period and formed a new administration team. Managed the completion of large infrastructure projects, the formation of new academic departments and streamlined processes for essential service functions such as grants accounting, procurement, and facilities management. Responsible for all College functions including personnel, recruiting, staffing, program administration, faculty evaluation, and budgeting.

Program Director, Applied Mathematics September 2014 – June 2017
National Science Foundation
Division of Mathematical Sciences

Oversaw disciplinary core programs in the Applied Mathematics Program in the Division of Mathematical Sciences, as well as programs supporting team projects in the Math and Physical Sciences Directorate. Managed the Program budget and online initiatives. Co-chaired the NSF-wide Interest Group on Complex Systems.

ACADEMIC APPOINTMENTS

Montclair State University, College of Science and Mathematics

Department of Applied Mathematics and Statistics

Professor

January 2020 – present

Department of Mathematical Sciences

Professor

September 2010 – December 2019

Associate Professor

September 2005 – August 2010

Assistant Professor

September 2001 – August 2005

ONR/ASEE Postdoctoral Fellowship

January 2000 - August 2001

U.S. Naval Research Laboratory

Washington, DC

Assistant Professor (non-tenure track)

September 1998 - December 1999

University of Delaware

Department of Mathematical Sciences

EDITORIAL AND ADVISORY BOARDS

1. NSF Advisory Council for Environmental Research and Education, Member, 2018 – present.
2. NJ Research and Development Council, Member, 2017-present.
3. EdgeDiscovery Advisory Council (formerly NJEdge), Member, 2020-present.
4. Associate Editor of Mathematical Biosciences and Engineering (MBE), 2020-present.
5. Associate Editor of SIAM Journal on Applied Dynamical Systems (SIADS), 2015-present.
6. SIAM Education Committee, Member, 2017-2020.
7. Chaos: An Interdisciplinary Journal of Nonlinear Science, Advisory Board member, published by the American Institute of Physics, 2008-2017.

RESEARCH GRANT AWARDS

1. 06/2020-05/2025. Partnered Internships: Including Families, Faculty, and Industry in STEM Education to Improve Success in STEM Career Pathways, PI: Amy Tuininga, Co-PIs: Yasemin Besen-Cassino, Lora Billings, Nina Goodey, NSF Award number HRD-1953631 (\$2,000,000).
2. 07/2019-06/2022. RUI: Stochastic Interactions: Understanding Invasion and Extinction in Ecological Systems, PI: Eric Forgoston, Co-PI: Lora Billings, NSF Award number DMS-1853610, (\$249,997).
3. 02/2019-02/2024. Garden State LSAMP Phase III, PI: Alexander Gates at Rutgers

- University, Newark, NSF Award number HRD-1909824, (Total \$4,000,000), MSU Subaward, PI: Lora Billings (\$257,365).
4. 07/2014-06/2019. RUI: Transport of inertial particles in time-dependent and stochastic flows, PI: Eric Forgoston, Co-PIs: Lora Billings and Philip Yecko, NSF Award number DMS-1418956, (\$299,987).
 5. 07/2014-06/2019. Garden State LSAMP Phase II, PI: Alexander Gates at Rutgers University, Newark, Co-PIs: Gregory Jackson, Jeffrey Toney, and Lora Billings (replacing Robert Prezant in 2017), NSF Award number HRD-1400780, (\$2,800,000).
 6. 09/2012-08/2017. Understanding the Dynamics of Stochastic Disease Spread in Metapopulations, PI: Eric Forgoston, Co-PI: Lora Billings, NSF Award number CMMI-1233397, (\$300,966).
 7. 04/30/12-06/30/12. The Effect of Latency in Adaptive Network Models, PI: Lora Billings. Office of Naval Research, Contract Grant No. N00173-12-1-G004 (\$25,185).
 8. 09/2009-08/2012. Collaborative Research: Multi-scale modeling of infectious diseases in fluctuating environments - Prediction and control, PI: Lora Billings, Co-PI's: Derek Cummings (Johns Hopkins) and Leah Shaw (College of William and Mary), NIH-NIGMS Award number R01GM090204, (\$791,316).
 9. 09/2010-08/2011. MRI-R2: CSAM Acquisition of Scientific Computing Capacity, PI: David Trubatch, co-PIs: Lora Billings, Chunguang Du, Bogdan Nita, Philip Yecko, NSF Award number DMS-0959461, (\$129,372).
 10. 09/2009-08/2012. MRI: Acquisition of a High-Performance Computer Cluster Supporting Computational Science Research and Learning, PI: Stefan Robila, Senior Personnel: Lora Billings, NSF Award number CNS-0922644, (\$190,000).
 11. 06/2008-09/2009. Conference on Innovation in Undergraduate Research and Teaching. PI: David Trubatch, Co-PI: Lora Billings and Diana Thomas, NSF Mathematics Program, NSF Award number DMS-0806218 (\$23,500).
 12. 07/2006–09/2009. Controlling interacting systems in noisy environments. PI: Lora Billings, ARO Mathematical Sciences Research Area of Cooperative Systems (\$133,426).
 13. 09/2004–09/2008. RUI: An analysis of infectious disease dynamics. PI: Lora Billings, NSF Award number DMS-0414087 (\$129,969).
 14. 6/2003-8/2004. Analysis and Control of Emergent Dynamics in Epidemiology. PI: Lora Billings, DARPA Award Number: DAAD19-03-1-0134 (\$79,191).
 15. 08/2002-07/2003 Analysis and Control of Disease Propagation. PI: Lora Billings, Office of Naval Research, Contract Grant No. N00173-02-1-G909 (\$49,995).
 16. 09/2003-08/2006 NSF MRI/RUI: Acquisition of a Linux Cluster for Numerical Simulations of Excitable Media," PI: Roman Zaritski, Senior Researcher: Lora Billings, (\$100,000).
 17. 08/2001-07/2002. Dynamics of Information Distribution under IO Attacks. PI: Lora Billings, Office of Naval Research, Contract Grant No. N00173-01-1-G911 (\$49,421).

PUBLICATIONS and PRESENTATIONS

REFEREED PUBLICATIONS (MSU Students noted by *)

1. Michael A.S. Thorne, Eric Forgoston, Lora Billings, Anje-Margriet Neutel, "Matrix Scaling and Tipping Points." *SIAM Journal on Applied Dynamical Systems*, to appear (2021).
2. Kristin Carfora*, Eric Forgoston, Lora Billings, and Jennifer Adams Krumins, "Seasonal Effects on the Stoichiometry of Microbes, Primary Production, and Nutrient Cycling." *Theoretical Ecology*, (2021).
3. Lora Billings and Eric Forgoston, "Seasonal Forcing in Stochastic Epidemiology Models." *Ricerche di Matematica*, 67, 1 (2018) 27–47.
4. Pralhad Burli*, Eric Forgoston, Pankaj Lal, Lora Billings, and Bernabas Wolde, "Adoption of switchgrass cultivation for biofuel under uncertainty: A discrete-time modeling approach." *Biomass and Bioenergy*, 105 (2017) 107-115.
5. Garrett T. Nieddu*, Lora Billings, James H. Kaufman, Eric Forgoston, and Simone Bianco, "Extinction Pathways and Outbreak Vulnerability in a Stochastic Ebola Model." *Journal of The Royal Society Interface* 14 (2017).
6. Martha Bauver*, Eric Forgoston, and Lora Billings, "Computing the optimal path in stochastic dynamical systems." *Chaos* 26, 083101 (2016).
7. Krumins, Jennifer Adams, Valdis Krumins, Eric Forgoston, Lora Billings, and Wim H. van der Putten. "Herbivory and Stoichiometric Feedbacks to Primary Production." *PLOS ONE* 10, 6 (2015) e0129775.
8. Schwartz, Ira B., Lora Billings, Thomas W. Carr, and M. I. Dykman. "Noise-induced switching and extinction in systems with delay." *Physical Review E* 91, 1 (2015) 012139.
9. Garrett T. Nieddu*, Lora Billings, and Eric Forgoston, "Analysis and control of pre-extinction dynamics in stochastic populations." *Bulletin of Mathematical Biology* 76, 12 (2014) 3122-3137.
10. Lora Billings, "Succeeding in Undergraduate Student Research: A Few Helpful Hints for Advisors," *PRIMUS* 23, 9 (2013), pp. 798-804.
11. Lora Billings, Luis Mier-y-Teran-Romero, Brandon Lindley, and Ira B. Schwartz, "Intervention-Based Stochastic Disease Eradication," *PLOS ONE* 8 (2013) e70211.
12. Jackson Burton*, Lora Billings, Derek A. T. Cummings, and Ira B. Schwartz, "Disease Persistence in Epidemiological Models: The Interplay between Vaccination and Migration," *Mathematical Biosciences* 239, 1 (2012) 91-96.
13. Eric Forgoston, Lora Billings, Philip Yecko, and Ira B. Schwartz, "Set-based corral control in stochastic dynamical systems: Making almost invariant sets more invariant," *Chaos* 21(1), 013116 (2011).
14. Lucas Shaw, William M. Spears, Lora Billings, and Paul M. Maxim, "Effective Vaccination Policies," *Information Sciences* 180, 19 (2010), pp. 3728-3744.
15. Jonathan Ballone* (advisor Lora Billings), "Early die out events in SIR epidemic models," *Rose Hulman Undergraduate Math Journal*, Vol. 11, Issue 1 (2010).
16. Lora Billings, Mark I. Dykman, Marie McCrary*, A. N. Korotkov, and Ira B. Schwartz, "Switching barrier scaling near bifurcation points for non-Gaussian noise,"

- Physical Review Letters* 104, 140601 (2010).
17. Eric Forgoston, Lora Billings, and Ira B. Schwartz, "Accurate Time Series Prediction in Reduced Stochastic Epidemic Models," *Chaos* 19, 043110 (2009).
 18. Diana Thomas, Marion Weederma, Lora Billings, Joan Hoffacker, Robert Washington-Allen, "When to Spray: A Time Scale Calculus Approach to Controlling the Impact of West Nile Virus," *Ecology and Society* 14 (2009) article no. 21.
 19. Ira B. Schwartz, Lora Billings, Mark Dykman, and Alexandra Landsman, "Predicting extinction rates in stochastic epidemic models" *Journal of Statistical Mechanics: Theory and Experiment* (2009) P01005.
 20. Lora Billings, Ira B. Schwartz, and Mark I. Dykman, "Thermally activated switching in the presence of non-Gaussian noise," *Physical Review E* 78 (2008) 051122.
 21. Lora Billings and Ira B. Schwartz, "Identifying almost invariant sets in stochastic dynamical systems," *Chaos* 18 (2008) 023122.
 22. Lora Billings, Amy Fiorillo*, and Ira B. Schwartz, "Vaccinations in disease models with antibody-dependent enhancement," *Mathematical Biosciences* 211 (2008) pp. 265-281.
 23. Leah B. Shaw, Lora Billings, and Ira B. Schwartz, "Using dimension reduction to improve outbreak predictability of multistrain diseases," *Journal of Mathematical Biology* 55 (2007) pp. 1-19.
 24. Lora Billings, Ira B. Schwartz, Leah B. Shaw, Marie McCrary, Donald S. Burke, and Derek A. T. Cummings, "Instabilities in multisero-type disease models with antibody-dependent enhancement," *Journal of Theoretical Biology* 246 (2007) pp. 18–27.
 25. Ira B. Schwartz, L. B. Shaw, D.A.T. Cummings, Leah B. Shaw, Marie McCrary*, and Donald S. Burke, "Chaotic desynchronization of multi-strain diseases," *Physical Review E* 72, 066201 (2005).
 26. Derek A. T. Cummings, Ira B. Schwartz, Lora Billings, Leah B. Shaw, and Donald S. Burke, "Dynamic Effects of Antibody Dependent Enhancement on the Fitness of Viruses," *Proceedings of the National Academy of Sciences* 102 (2005), pp. 15259-15264.
 27. Carmen Piccolo* and Lora Billings, "The Effect of Vaccinations in an Immigrant Model," *Mathematical and Computer Modelling* 42 (2005), pp. 291-299.
 28. W.-w. Tung, Y. Qi, J.B. Gao, Y. Cao, L. Billings, "Direct characterization of chaotic and stochastic dynamics in a population model with strong periodicity," *Chaos, Solitons and Fractals* 24 (2005), pp. 645–652.
 29. L. Billings, I. B. Schwartz, D. S. Morgan, E. M. Bollt, R. Meucci, and E. Allaria, "Stochastic bifurcation in a driven laser system: Experiment and theory," *Physical Review E* 70, 026220 (2004).
 30. I. B. Schwartz, L. Billings, and E. M. Bollt, "Dynamical Epidemic Suppression Using Stochastic Prediction and Control," *Physical Review E* 70, 046220 (2004).
 31. I. B. Schwartz, D. S. Morgan, L. Billings, and Y.-C. Lai, "Multi-scale continuum mechanics: From global bifurcations to noise induced high dimensional chaos," *Chaos* 14:2 (2004), pp. 373-386.
 32. R. Meucci, D. Cinotti, E. Allaria, I. Triandaf, L. Billings, D. Morgan, and I. B. Schwartz, "Global manifold control in a driven laser: sustaining chaos and regular dynamics" *Physica D*, 189:1-2 (2004), pp. 70-80.
 33. L. Billings, E. M. Bollt, D. Morgan, and I. B. Schwartz, "Stochastic global bifurcation in perturbed Hamiltonian systems," *Discrete and Continuous Dynamical Systems*,

Proceedings of the Fourth International Conference on Dynamical Systems and Differential Equations, May 24-27, 2002, Wilmington, NC, USA, (2003), pp. 123-132.

34. Y.-C. Lai, Z. Liu, L. Billings, and I. B. Schwartz, "Noise-induced unstable dimension variability and transition to chaos in random dynamical systems," *Physical Review E* 67, 026210 (2003).
35. L. Billings, E. M. Bollt, and I. B. Schwartz, "Phase-Space Transport of Stochastic Chaos in Population Dynamics of Virus Spread," *Physical Review Letters* 88, 234101 (2002).
36. E. M. Bollt, L. Billings, and I. B. Schwartz, "A manifold independent approach to understanding transport in stochastic dynamical systems," *Physica D* 173 (2002), pp.153-177.
37. L. Billings, W. M. Spears, and I. B. Schwartz, "A Unified Prediction of Computer Virus Spread in Connected Networks," *Physics Letters A* 297 (2002), pp. 261-266.
38. Z. Liu, Y.-C. Lai, L. Billings, and I. B. Schwartz, "Transition to chaos in continuous-time random dynamical systems," *Physical Review Letters* 88, 124101 (2002).
39. L. Billings and I. B. Schwartz, "Exciting chaos with noise: unexpected dynamics in epidemic outbreaks," *Journal of Mathematical Biology* 44 (2002), pp. 31-48.
40. I. B. Schwartz, L. Billings, J. J. Pancrazio, and J. M. Schnur, "Methods for short time series analysis of cell-based biosensor data," *Biosensors & Bioelectronics* 16 (2001), pp. 503-512.
41. L. Billings and E. M. Bollt, "Probability density functions of some skew tent maps," *Chaos, Solitons and Fractals*, 12 (2001), pp. 365-376.
42. L. Billings, I. B. Schwartz, J. J. Pancrazio, and J. M. Schnur, "Dynamic and geometric analysis of short time series: a new comparative approach to cell-based biosensors," *Physics Letters A*, 286 (2001), pp. 217-224.
43. T. W. Carr, L. Billings, I. B. Schwartz and I. Triandaf, "Bi-instability and the global role of unstable resonant orbits in a driven laser," *Physica D*, 147 (2000), pp. 59-82.
44. L. Billings, J. H. Curry and V. Robins, "Chaos in Relaxed Newton's Method: The Quadratic Case," *Contemporary Mathematics*, 252 (1999), pp. 63-70.
45. L. Billings, J. H. Curry and E. Phipps, "Symmetric Functions and Exact Lyapunov Exponents," *Physica D*, 121 (1998), pp. 44-64.
46. L. Billings, J. H. Curry and E. Phipps, "Lyapunov Exponents, Singularities and a Riddling Bifurcation," *Physical Review Letters*, 79 (1997), pp. 1018-1021.
47. L. Billings and J. H. Curry, "On Noninvertible Mappings of the Plane: Eruptions," *Chaos*, 6 (1996), pp. 108-120.

BOOKS AND CHAPTERS

1. Eric Forgoston, Lora Billings and Ira B. Schwartz, "Model Reduction in Stochastic Environments," in *Stochastic PDEs and Modelling of Multiscale Complex System*, edited by X. Chen, Y. Lv and W. Wang, *Interdisciplinary Mathematical Sciences: Volume 20*, World Scientific, pp. 37-61 (2019).
2. Ira B. Schwartz, Lora Billings, David Holt, and Ioana Triandaf, "Chemical and Biological Sensing -- Modeling and Analysis from the Real World," Chapter 3 of "SIAM Homeland Security," edited by Carlos Castillo-Chavez and published by SIAM (2003), pp. 55-86.

PROCEEDINGS/TECHNICAL REPORTS - not refereed

1. Advisory Committee on Environmental Research and Education, Public Health and Environmental Research and Education Subcommittee, "Environmental and Human Health Research Priorities," National Science Foundation Reports, (2021).
2. Lora Billings, Ira B. Schwartz, and Leah B. Shaw, "The Dynamics of Antibody Dependent Enhancement in Multi-Strain Diseases with Vaccination," Proceedings from Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, World Scientific (2008).
3. Ira B. Schwartz and Lora Billings, "Fluctuation Induced Almost Invariant Sets," Naval Research Laboratory Memo Report NRL/MR/6790--0609012 (2006).
4. I. B. Schwartz, L. Billings, D. S. Morgan, and Y.-C. Lai, "Noise induced dimension changing bifurcations," Proceedings from SPIE: Noise in Complex Systems and Stochastic Dynamics held in Austin, TX (2005).
5. I. B. Schwartz and L. Billings, "Stochastic Epidemic Outbreaks: Why Epidemics Are Like Lasers," Proceedings from SPIE: Noise in Complex Systems and Stochastic Dynamics held in Maspalaomas Gran Canaria Island (2004).
6. L. Billings and G. Weinstein, "Survey of Multimedia Enhancements For Calculus" Proceedings of the Fifteenth Annual International Conference on Technology in Collegiate Mathematics (ICTCM), held in Orlando, FL (2003).
7. W. M. Spears, L. Billings, and I. B. Schwartz, Modeling Viral Epidemiology, Naval Research Laboratory Memo Report, NRL/MR/6700--01-8537 (2001).
8. L. Billings and J. H. Curry, Bifurcations in a Class of Noninvertible Mappings of the Plane. Proceedings from CESA '96 IMACS Multiconference: Computational Engineering in Systems Applications held in Lille, France. 2 (1996), pp. 625-629.

POPULAR PRESS - not refereed

1. Lora Billings, "Inspiring the Next Generation of STEM Innovators," EdgeDiscovery Magazine, Fall 2020/Winter 2021.
2. Lora Billings, "Chaos (and Dynamics) for All!" book review of David Feldman's *Chaos and Dynamical Systems*. SIAM News, Volume 53(6), July/August 2020.
3. Lora Billings and Eric Forgoston, New Results in Stochastic Analysis Using Dynamical Systems Theory, SIAM News, Volume 52 (1), January/February 2019.

PROFESSIONAL PRESENTATIONS (Select)

1. April 15, 2021, Math and Stats Colloquium, "Stability of Food Webs and Extinction of Species (and Disease)," co-presented with Eric Forgoston, Department of Mathematics & Statistics, Utah State University.
2. September 15, 2020, International Minicourse in Biomathematics (virtual): "Modelling Outbreaks and Measures to Stop Them: COVID-19 and Ebola," co-presented with Eric Forgoston, hosted by Stefanella Boatto, Universidade Federal do Rio de Janeiro, Brazil.
3. July/August 2020, SIAM News book review, "Chaos (and Dynamics) for All!" <https://sinews.siam.org/Details-Page/chaos-and-dynamics-for-all>.

4. March 28, 2019, IBM Research Almaden - Distinguished Speaker Series, "Stochastic population models: the dynamics of invasion and extinction," San Jose, CA.
5. March 8, 2019, invited alumni speaker on career opportunities in applied mathematics, University of Colorado, Boulder.
6. August 6, 2018, Minisymposium co-organizer and speaker, "Stochastic Population Models: The Dynamics of Disease Invasion," SIAM 2018 Conference on the Life Sciences, Minneapolis, MN.
7. June 6, 2018, Math Biology Seminar, "Invasion and Extinction in Stochastic Epidemic Models," co-presented with Eric Forgoston, University of York, UK.
8. May 22, 2017, Minisymposium co-organizer and speaker, "Stochastic population models: the dynamics of invasion and extinction," SIAM 2017 Conference of Applications of Dynamical Systems, Snowbird, Utah.
9. May 5, 2017, invited speaker to Cedar Grove High School, NJ to talk about research and careers in mathematics.
10. October 17, 2016, Differential Equations Seminar, "Stochastic population models: invasion and extinction in disease modeling," US Military Academy, West Point, NY.
11. October 13, 2016, Mathematics Seminar, "Rare events in stochastic population models: invasion and extinction in disease modeling," Lafayette College, Easton, PA.
12. July 13, 2016, Minisymposium organizer and speaker, "Analysis and Control of Pre-Extinction Dynamics in Population Networks," 2016 SIAM Annual Meeting, Boston, MA.
13. May 14, 2016, Invited speaker, NJ Governor's STEM Scholars, Montclair State University.
14. December 6, 2015, Invited Speaker, "Pre-Extinction Dynamics in Stochastic Populations," Network Frontier Workshop 2015, Northwestern University.
15. May 17-21, 2015, Conference co-organizer/Panel Moderator, SIAM 2015 Conference of Applications of Dynamical Systems, Snowbird, Utah.
16. May 13-15, 2015, Conference co-organizer/Moderator, "MPE 2013+ Workshop on Natural Disasters," Georgia Tech, GA.
17. March 4, 2015, Focus session speaker, "Noise Induced Switching and Extinction in Systems with Delay," American Physical Society 2015 March Meeting, San Antonio, TX.
18. July 21, 2014, Invited speaker, "Analysis and control of pre-extinction dynamics in stochastic populations," Applied Dynamics Conference, University of Colorado, Boulder.
19. March 14, 2014, Invited Seminar, "Disease extinction: A dynamical systems approach to predicting epidemic rare events," Applied & Interdisciplinary Mathematics Seminar, University of Michigan.
20. October 7, 2013, Panelist, "Learning from Analogies," Cyber Security Education Brainstorming Workshop, Rutgers University, NJ.
21. May 22, 2013, Invited Plenary Speaker, "Predicting Epidemic Rare Events: A Dynamical Systems Perspective of Disease Extinction and Control," SIAM 2013 Conference of Applications of Dynamical Systems, Snowbird, Utah.
22. March 18, 2013, Contributed talk, "Intervention-Based Stochastic Disease Eradication," American Physical Society 2013 March Meeting, Baltimore, MD.
23. January 4, 2013, Contributed Poster, "Intervention-Based Stochastic Disease Eradication," Dynamics Days 2013, Baltimore, MD.

24. March 17, 2012, Minisymposium talk, "Disease Persistence in Epidemiological Models: The Interplay between Vaccination and Migration," American Mathematical Society 2012 Eastern Sectional Meeting, George Washington University, Washington, DC.
25. February 28, 2012, Contributed talk, "Vaccine enhanced extinction in stochastic epidemic models," American Physical Society 2012 March Meeting, Boston, MA.
26. February 8, 2012, Invited Seminar, "Prediction and control of disease spread in populations," Laurence H. Baker Center for Bioinformatics and Biological Statistics, Iowa State University.
27. January 4, 2012, Contributed Poster, "Disease Persistence in Epidemiological Models: The Interplay between Vaccination and Migration," Dynamics Days 2012, Baltimore, MD.
28. May 25, 2011, Contributed talk, "Non-Gaussian Noise and its Effects on Scaling Laws Near Bifurcation Points," SIAM Conference of Applications of Dynamical Systems, Snowbird, Utah.
29. December 3, 2010, Invited colloquium, "Understanding disease spread: Predicting the next outbreak," Monmouth State University, NJ.
30. April 26, 2010, Poster presentation, "Frontiers in Mathematical Biology: NSF-NIH PIs Meeting 2010", University of Maryland, College Park, MD.
31. March 19, 2010, Contributed talk, "Switching and control in stochastic double gyres," American Physical Society March Meeting, Portland, Oregon.
32. May 19, 2009, Contributed talk, "Basin switching in the presence of non-Gaussian noise," SIAM Conference of Applications of Dynamical Systems, Snowbird, Utah.
33. March 20, 2009, Contributed talk, "Interstate switching induced by non-Gaussian noise," American Physical Society March Meeting, Pittsburgh, PA.
34. March 17, 2009, Invited talk, "Interacting Systems in Noisy Environments," ARO System of Systems Analysis Workshop, Physical Sciences Laboratory, New Mexico State University.
35. August 6, 2008, Minisymposium organizer and speaker, "Vaccinations in Disease Models with Antibody-Dependent Enhancement," 2008 SIAM Conference on Life Sciences, Montreal, Canada.
36. July 11, 2008, Invited seminar speaker, "Vaccinations in Multi-Strain Disease Models with ADE", Mathematical and Theoretical Biology Institute, Arizona State University.
37. May 19, 2008, Invited Minisymposium speaker, "ADE in Multi-strain Disease Models," Frontiers in Applied and Computational Mathematics (FACM '08), New Jersey Institute of Technology, Newark, NJ.
38. April 21, 2008, Plenary speaker, ADE in Multi-strain Disease Models," Structured Populations Workshop at Banff International Research Station, Alberta, Canada. April 21-25, 2008.
39. March 14, 2008, Contributed talk, "Constructing almost invariant sets for multi-stable systems," American Physical Society March Meeting, New Orleans, LA.
40. November 14, 2007, Invited seminar speaker, "Antibody dependent enhancement: Complex dynamics in the evolution of diseases," Institute for Urban Ecosystem Studies (IUES), Kean University, NJ.
41. June 23, 2007, Plenary speaker, "Multi-strain disease models with antibody dependent enhancement," Workshop on Dynamical Systems and Applications at

- Banff International Research Station, Alberta, Canada. June 22-24, 2007. Conference organizers: Bernard Brooks (Rochester Institute of Technology), Harold Hastings (Hofstra University), Herbert Kunze (Guelph University), Michael A. Radin (Rochester Institute of Technology).
42. November 4, 2006, Plenary speaker, "Antibody dependent enhancement: Complex dynamics in the evolution of diseases," Mathematical Association of America New Jersey Section - Fall Meeting, Seton Hall University, South Orange, NJ.
 43. October 24, 2006, Mathematical Biology Seminar Lecture, "Multi-strain disease models with antibody-dependent enhancement," Center for Applied Mathematics and Statistics, NJIT, Newark, NJ.
 44. October 10, 2006, Invited Lecture, "Multi-strain disease models with antibody-dependent enhancement" DIMACS workshop on Models of Co-Evolution of Hosts and Pathogens, Rutgers University, New Brunswick, NJ.
 45. August 20, 2005, Plenary speaker, "Antibody dependent enhancement in multi-strain diseases," Mathematical Epidemiology Workshop at Banff International Research Station, Alberta, Canada. August 20-25, 2005.
 46. August 3, 2005, Invited speaker, "Analyzing the effects of noise," George Washington University Summer Program for Women in Mathematics, at the Naval Research Laboratory, Washington, DC.
 47. May 24, 2005, Invited Minisymposium speaker, "Noise Induced Dimension Changing Bifurcations," at the SIAM Conference of Applications of Dynamical Systems, Snowbird, UT.
 48. May 14, 2005, Invited Minisymposium speaker, "Chaotic Desynchronization of Multi-Strain Diseases," Frontiers in Applied and Computational Mathematics (FACM '05), New Jersey Institute of Technology, Newark, NJ.
 49. March 22, 2005, Invited Colloquium Lecture, "Epidemic Models and the Pattern of Outbreaks," Dept. of Theoretical and Applied Mathematics, University of Akron, OH.
 50. December 11, 2004, Invited Minisymposium speaker, "Stochastic Epidemic Outbreaks: Why Epidemics Are Like Lasers," Canadian Mathematical Society National Meeting, Montreal, Canada.
 51. July 13, 2004, Minisymposium organizer and speaker, SIAM 2004 Annual Meeting, "New Problems in Stochastic Dynamics of Multi-Potentials," co-organized with Ira Schwartz, Portland, OR. My talk: "Stochastic Bifurcations to Chaos."
 52. July 11, 2004, Contributed talk, SIAM Conference on the Life Sciences 2004, "Multi-Strain Disease Dynamics," Portland, OR.
 53. June 18, 2004, Invited Minisymposium speaker, AIMS' Fifth International Conference on Dynamical Systems and Differential Equations, Special Session "Low-dimensional Structures, Reduced Description and Stochastic Processes in Atmosphere/ocean Dynamics," California State Polytechnic University, Pomona, CA. My talk: "Noisy chaotic dynamics."
 54. February 23, 2004, Invited Lecture, "Analysis of the spread of email viruses," Networks and Power Laws Conference, NRL, Washington, DC.
 55. February 2, 2004, Invited Lecture, "Stochastic and deterministic bifurcations in lasers: Universal characteristics in single and coupled systems with delay" Michigan State University, East Lansing, MI.
 56. January 4, 2004, Contributed Poster, "Analysis of the spread of email viruses,"

- Dynamics Days 2004, Chapel Hill, NC.
57. January 8, 2003, Plenary Speaker, "Phase-Space Transport of Stochastic Chaos," Dynamics Days 2003, Scottsdale, Arizona.
 58. September 10, 2002, Mathematical Biology Seminar Lecture, "Noise Induced Chaos in the SEIR Model," Center for Applied Mathematics and Statistics, NJIT, Newark, NJ.
 59. July 11, 2002, Contributed Lecture, "Phase Space Transport of Stochastic Chaos in Population Dynamics of Virus Spread," 2002 SIAM Annual Meeting, Philadelphia, PA.
 60. July 1, 2002, Invited Lecture, "Chaotic Epidemic Outbreaks: Deterministic or Random?" DIMACS International Conference on Computational and Mathematical Epidemiology, Rutgers University, New Brunswick, NJ.
 61. June 10-13, 2002, Organizer and Speaker, DIMACS Working Group on Analogies Between Computer Viruses and Immune Systems and Biological Viruses and Immune Systems, Rutgers University, New Brunswick, NJ. The title of the talk on June 11, 2002 was "Stochastic Modeling and Chaotic Epidemic Outbreaks."
 62. May 26, 2002, Invited Lecture, "Noise induced chaos," in the session on Invariant Manifolds and Their Applications, Fourth International Conference on Dynamical Systems and Differential Equations, Wilmington, NC.
 63. May 15, 2002, Theoretical Ecology Lab Tea Lecture, "Noise Induced Chaos in the SEIR model," Department of Ecology and Evolutionary Biology, Princeton University, Princeton, NJ.
 64. March 11, 2002, Dynamical Systems Seminar Lecture, "Noise Induced Chaos," Mathematics Department, Boston University, Boston, MA.
 65. March 7, 2002, Invited Lecture in the minisymposium "Patterns, Persistence, and Environment in Population Dynamics: Theory and Data" at the SIAM Conference on the Life Sciences, Boston, MA. The talk was titled "Unexpected Nonlinear Dynamics in Stochastic Epidemic Models."
 66. January 4, 2002, Contributed Lecture, "Noise induced chaos in population models," Dynamics Days 2002, Baltimore, MD.

OTHER AWARDS

2019 Mentoring Award, Association for Women in Science (AWIS)
 2008 Office Naval Research Summer Faculty Fellowship
 2008 MSU Distinguished Researcher Award
 2008 MSU Sokol Faculty Fellowship Award
 2008 MSU College of Science and Mathematics Faculty Research Award
 2008 Nominated as a member of Phi Kappa Phi

TEACHING EXPERIENCE

Undergraduate Courses

Applied Precalculus, Precalculus, Calculus A, Calculus I, Calculus III, Linear Algebra, Differential Equations, Mathematical Modeling, Mathematical Biology, Transitions to Advanced Math

Graduate Courses

Applied Math: Discrete, Applied Mathematics: Continuous, Differential Equations, Applied Industrial Mathematics

STUDENT RESEARCH

Ph.D. students (Environmental Science and Management)

- Garrett Nieddu, co-advisor with Eric Forgoston, Outbreak and Extinction Dynamics in Stochastic Populations, May 2018
- Pralhad Burli, committee member (advisor Pankaj Lal), Economic and Environmental Assessment of Advanced Biofuels: Adoption Under Uncertainty, Farmer Willingness, and Land Use Implications, January 2018

M.S. THESIS Advisor

- Michael Morley, MS Statistics, Quantifying Probabilities of Rare Events in Stochastic Population Models, August 2014
- Jonathan Hayes, MS Mathematics, The Persistence of Infectious Diseases in Metapopulations, May 2012
- Jackson Burton, MS Mathematics, Capturing Low Probability Behavior of Disease Dynamics in Coupled Populations, May 2011
- Karin Weule, MS Mathematics, An Exploration of Modeling Techniques for the Study of the Dynamics of E-Mail Viruses, December 2010
- David Burger, MS Mathematics, Migration and Mixing Between Populations in Disease Models, May 2009
- Amy Fiorillo, MS Mathematics, Dynamics of a Two Serotype Disease with Antibody Dependent Enhancement, May 2006
- Nancy Picinic-Riccia, MS Mathematics, A Survey of the Methods to Find Probability Density Functions, May 2006
- Kirsten Viz, MS Mathematics, Disease Outbreaks in Coupled Populations: An Application of Measles Spread in Cameroon, May 2005

M.S. THESIS Committee member

- Clair Burke, Extinction of Species Due to Deterministic and Stochastic Interactions in Food Webs, April 2021.

- Sausan Odatalla, Stochastic Modeling of Zoonotic Disease, May 2020.
- Dunia Fernandez, Control of Secondary Extinctions in Stochastic Food Webs, May 2020.
- Alexa Aucoin, Inertial Particle Dynamics and Coherent Structures in Geophysical Fluid Flows, May 2018.
- Albert Jarvis, Understanding the Flow Structure of Low Reynolds Number Flows, May 2018.
- Kristin Carfora, Seasonal Switching Affects Bacterial-Fungal Dominance in an Ecological System, May 2018.
- Klodiana Shkemi, MS Mathematics, Dr. Eric Forgoston, Detection of Coherent Structures in Flows, October 2016.
- Martha Bauver, MS Mathematics, Advisor: Dr. Eric Forgoston, Computing the Optimal Path in Stochastic Dynamical Systems, May 2016.
- Gregory Slusarczyk, MS Mathematics, Dr. Eric Forgoston, Escape Rates for Coupled Particles in a Stochastic Environment, November 2011.
- Lucas Shaw, MS in Computer Science from University of Wyoming, Advisor: Dr. William Spears, A Computational Framework for Modeling the Spread of Pathogens and Generating Effective Containment Strategies in Weakly Connected Island Models, May 2007. This thesis received the University 2007 Outstanding Master's Thesis Award.

GRADUATE INDEPENDENT STUDIES

Pralhad Burli, Malgorzata Milej, Michael Morely, Jonathan Hayes, Jackson Burton, Marie McCrary, David Burger, Amy Fiorillo, Nancy Picinic-Riccia, Nick Senedzuk, Kirsten Viz, Karin Weule

UNDERGRADUATE INDEPENDENT STUDIES

Alexa Aucoin, Jamila Haramuniz, Ryan Dykstra, Jimmie Adriazola, Michael Morely, Nicholas Kass, Jonathan Hayes, Jonathan Ballone, Stephanie Haupin, Kristina Oriente, Erica Heine, David Burger, Jason Long, Marie McCrary, Julian Montefusco, Carmen Piccolo, Rajni Jain

PROFESSIONAL SERVICE

UNIVERSITY-BASED

University service

1. Search Committee for the University President, 2020
2. Co-Chair of the Presidential Advisory Committee on COVID-19 Related Planning (with Dean Janice Smolowitz), 2020 - present.

3. Search Committee Member for the Director of Admissions, 2020
4. Search Committee Member for the Vice President of Finance and Treasurer, 2020
5. Search Committee Member for the Vice President of Enrollment Management, 2020
6. Leadership Team Member, Committee on University Effectiveness, 2018-present
7. Search Committee Member for the Director of Grants Accounting, 2018-2019
8. Chair of the Search Committee for the Vice Provost for Research and Dean of the Graduate School, 2017
9. Board Member, Research & Development Council of New Jersey, 2017-present
10. Honorary Degree Committee Member, 2017, 2005
11. Search Committee Member for the Research Academy for University Learning Director, 2014
12. Member of the Committee on the Graduating Writing Requirement, 2013-2014
13. Search Committee Member for the Research Academy for University Learning Director, 2013
14. Member of the Patent Advisory Committee, 2012-2014
15. Search Committee Member for the Office of Research and Sponsored Programs Pre-Award Officer, 2009
16. Search Committee Member for the Office of Research and Sponsored Programs Director, 2007-2008
17. Search Committee Member for the Provost and Vice President of Academic Affairs, 2007
18. Honorary Degree Committee, 2017, 2005

College service

1. Member of MSU Doctoral Faculty, 2009-present
2. CSAM Interdisciplinary Council, 2007
3. College Research Committee, 2007
4. College Convocation Committee, 2003
5. College Committee on PR & Retention of Students, 2002

Department service

1. Department PAC member, 2013, 2010 (chair), 2006.
2. Department Steering Committee, 2011-2014
3. GK-12 Fellows in the Middle: Partnerships for Inquiry and Interdisciplinary Middle School Science and Mathematics Mentor, 2006-2011
4. Proposed PhD in Applied Mathematics committee, 2005-2010
5. Chair of Special Interest Group in Pure and Applied Math, 2004-2007
6. Faculty Search Committee, Applied Math, 2004, 2005
7. Scheduling Committee, 2004-2014
8. Department Website Committee, 2001-2013
9. Department Newsletter Committee, 2001-2004

DISCIPLINE-BASED

1. External Review Committee for the Department of Mathematics, University of Colorado, Colorado Springs, February 2020.
2. Organizing Committee Member, 2019 SIAM Conference on Applications of Dynamical Systems, 2018-2019.
3. Member of SIAM Dynamical Systems SIAG nomination committee, 2017.
4. Member of SIAM DiPrima prize selection committee, 2015-2016.
5. Elected Program Director for the SIAM Activity Group on Dynamical Systems for the 2014-2015 term.
6. Chair of the SIAM 2015 Conference on Applications of Dynamical Systems, with Co-Chair Panos Kevrekidis (University of Massachusetts, Amherst).
7. Co-organizer of the Math for the Planet Earth 2013+ Workshop on Natural Disasters. (<http://dimacs.rutgers.edu/Workshops/NaturalDisasters/>), May 13-15, 2015 at Georgia Institute of Technology.
8. Co-organizer of the workshop “Fluctuations in population biology, epidemiology, and evolution” at the Lorentz Center in Leiden, the Netherlands from August 11-15, 2014. (<http://www.lorentzcenter.nl/>)
9. Refereed manuscripts in the following journals:
Applied Mathematics and Computation, Applied Mathematical Modelling, Physical Review Letters, The Journal of Mathematical Biology, The Journal of Theoretical Biology, Europhysics, Physical Review E, Physica D, Physics Letters A, Proceedings of the Royal Society: Biological Sciences, Theoretical Population Biology, PLoS Computational Biology, CHAOS, SIAM Journal on Applied Dynamical Systems, The Journal of Biomathematics, The Canadian Applied Mathematics Quarterly, Multiscale Modeling and Simulation, Scholarpedia, Journal of Computational and Nonlinear Dynamics.