

Nicolas Lanchier

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EDUCATION AND RESEARCH POSITIONS

- 2013– **Associate Professor in Mathematics and Honors Faculty**, School of Mathematical and Statistical Sciences, Arizona State University, USA.
- 2007–2013 **Assistant Professor in Mathematics and Honors Faculty**, School of Mathematical and Statistical Sciences, Arizona State University, USA.
- 2005–2007 **Research Associate in Mathematics** under the supervision of Claudia Neuhauser at the Department of Ecology, Evolution, and Behavior of the University of Minnesota, USA.
- 2002–2005 **Ph.D. in Mathematics** under the supervision of Claudio Landim, and Teaching Assistant at the University of Rouen, France.
- 2001–2002 **Diploma of Advanced Studies** (2nd year of Master's Degree) analysis and stochastic models, Magna Cum Laude, University of Rouen, France.
- 2001 **Agrégation de Mathématiques**¹ (nationwide competition).
- 1999–2000 **Maîtrise in Mathematics** (1st year of Master's Degree), Magna Cum Laude, University of Rouen, France.
- 1998–1999 **Licence in Mathematics** (3rd year of Bachelor's Degree), Magna Cum Laude, University of Rouen, France.

¹In France, the Agrégation de Mathématiques is the most prestigious nationwide competition selecting people on their ability to teach, and consists of two written exams and three oral exams covering the following topics: abstract algebra, linear/multilinear algebra, Euclidean and projective geometry, topology, functional analysis, differential calculus, differential geometry, real and complex analysis, measure and integration theory, probability theory.

RESEARCH INTERESTS

Most mathematical models introduced in the life and social sciences literature that describe inherently spatial phenomena of interacting populations consist of systems of ordinary differential equations. These models, however, leave out any spatial structure or stochastic component while past research has identified space and stochasticity as key factors in how communities are shaped, and spatial stochastic models can result in predictions that strongly differ from their nonspatial deterministic counterparts. In contrast, my research aims at understanding the role of space and stochasticity in a wide variety of applied sciences such as physics, biology, sociology, economics, etc. through the mathematical analysis of a class of stochastic processes known as interacting particle systems. In these models, members of the population (particles) such as atoms, cells, plants, voters, players, etc. are located on the vertex set of a connected graph. The latter has to be thought of as a network of interactions that dictates the dynamics of the system as particles can only interact

locally with their neighbors, thus modeling the presence of an explicit spatial structure. Space in the context of interacting particle systems must be understood in a broad sense: an edge between two vertices of the underlying graph may be synonymous of geographic proximity, but also friendship relation, adherence to the same political party, etc. The main objective of research in this field is to understand the macroscopic behavior and spatial patterns that emerge from the microscopic interactions that describe the dynamics of large systems.

RESEARCH AND TEACHING AWARDS

- Nicolas Lanchier (sole PI). Stochastic processes on hypergraphs and dynamic graphs. NSF Grant in probability theory DMS-10-05282 (\$178,576 from 08/2010 to 08/2014).
- Nicolas Lanchier (sole PI). Stochastic spatial models of social dynamics. NSA Grant in probability theory MPS-14-040958 (\$40,000 from 03/2015 to 09/2017).
- Recipient of the Charles Wexler Teaching Award² in 2012.

²The Charles Wexler Teaching Award is presented each year to an outstanding teacher/mentor of undergraduate mathematics. The winner is by the awards committee based on nominations made by undergraduate students with majors in the School of Mathematical and Statistical Sciences.

RESEARCH AND SCHOLARLY WORK

Peer-reviewed books (as an associate professor at ASU)

1. Nicolas Lanchier. Stochastic Modeling. Universitext. *Springer, Cham*, 2017. xiii+303. MR3617451 (49,075 chapter downloads since Feb 2017).

Peer-reviewed articles (as a PhD student or postdoc)

01. Nicolas Lanchier. Phase transitions and duality properties of a successional model. *Adv. Appl. Probab.*, 37:265–278, 2005. MR2135162.
02. Nicolas Lanchier. A multitype contact process with frozen sites: a spatial model of allelopathy. *J. Appl. Probab.*, 42:1109–1119, 2005. MR2203826.
03. Lamia Belhadji and Nicolas Lanchier. Individual versus cluster recoveries within a spatially structured population. *Ann. Appl. Probab.*, 16:403–422, 2006. MR2209347.
04. Nicolas Lanchier and Claudia Neuhauser. Stochastic spatial models of host-pathogen and host-mutualist interactions I. *Ann. Appl. Probab.*, 16:448–474, 2006. MR2209349.
05. Nicolas Lanchier and Claudia Neuhauser. A spatially explicit model for competition among specialists and generalists in a heterogeneous environment. *Ann. Appl. Probab.*, 16:1385–1410, 2006. MR2260067.

Peer-reviewed articles (as an assistant professor at ASU)

06. Nicolas Lanchier and Claudia Neuhauser. Voter model and biased voter model in heterogeneous environments. *J. Appl. Probab.*, 44:770–787, 2007. MR2355591.

07. Rick Durrett and Nicolas Lanchier. Coexistence in host-pathogen systems. *Stochastic Process. Appl.*, 118:1004–1021, 2008. MR2418255.
08. Lamia Belhadji and Nicolas Lanchier. Two-scale contact process and effects of habitat fragmentation on metapopulations. *Markov Process. Related Fields*, 14:487–514, 2008. MR2473765.
09. Nicolas Lanchier and Claudia Neuhauser. Spatially explicit non-Mendelian diploid model. *Ann. Appl. Probab.*, 19:1880–1920, 2009. MR2569811.
10. Benjamin Chan, Rick Durrett and Nicolas Lanchier. Coexistence for a multitype contact process with seasons. *Ann. Appl. Probab.*, 19:1921–1943, 2009. MR2569812.
11. Nicolas Lanchier. Opinion dynamics with confidence threshold: an alternative to the Axelrod model. *ALEA Lat. Am. J. Probab. Math. Stat.*, 7:1–18, 2010. MR2644039.
12. Nicolas Lanchier and Claudia Neuhauser. Stochastic spatial models of host-pathogen and host-mutualist interactions II. *Stoch. Models*, 26:399–430, 2010. MR2739344.
13. Yun Kang and Nicolas Lanchier. Expansion or extinction: deterministic and stochastic two-patch models with Allee effects. *J. Math. Biol.*, 62:925–973, 2011. MR2795701.
14. Nicolas Lanchier. Contact process with destruction of cubes and hyperplanes: forest fires versus tornadoes. *J. Appl. Probab.*, 48:352–365, 2011. MR2840304.
15. Daniella Bertacchi, Nicolas Lanchier and Fabio Zucca. Contact and voter processes on the infinite percolation cluster as models of host-symbiont interactions. *Ann. Appl. Probab.*, 21:1215–1252, 2011. MR2857447.
16. Nicolas Lanchier. Two-scale multitype contact process: coexistence in spatially explicit metapopulations. *Markov Process. Related Fields*, 17:151–186, 2011. MR2856238.
17. Yun Kang and Nicolas Lanchier. The role of space in the exploitation of resources. *Bull. Math. Biol.*, 74:1–44, 2012. MR2877206.
18. Nicolas Lanchier. The Axelrod model for the dissemination of culture revisited. *Ann. Appl. Probab.* 22:860–880, 2012. MR2953571.
19. Nicolas Lanchier and Jason Schweinsberg. Consensus in the two-state Axelrod model. *Stochastic Process. Appl.* 122:3701–3717, 2012. MR2965921.
20. Nicolas Lanchier. The critical value of the Deffuant model equals one half. *ALEA Lat. Am. J. Probab. Math. Stat.* 9:383–402, 2012. MR3069370.

Peer-reviewed articles^{3,4} (as an associate professor at ASU)

21. Nicolas Lanchier and **Jared Neuffer**. Stochastic dynamics on hypergraphs and the spatial majority rule model. *J. Stat. Phys.* 151:21–45, 2013. MR3045805.
22. Nicolas Lanchier and **Stylianos Scarlatos**. Fixation in the one-dimensional Axelrod model. *Ann. Appl. Probab.* 23:2538–2559, 2013. MR3127944.
23. Nicolas Lanchier. Stochastic spatial model of producer-consumer systems on the lattice. *Adv. Appl. Probab.* 45:1157–1181, 2013. MR3161301.
24. Nicolas Lanchier. The role of dispersal in interacting patches subject to an Allee effect. *Adv. Appl. Probab.* 45:1182–1197, 2013. MR3161302.

25. **Stephen Evilsizor** and Nicolas Lanchier. Evolutionary games on the lattice: best-response dynamics. *Electron J. Probab.* 19, no. 75, 12 pp, 2014. MR3256875.
26. Nicolas Lanchier and **Stylianios Scarlatos**. Clustering and coexistence in the one-dimensional vectorial Deffuant model. *ALEA Lat. Am. J. Probab. Math. Stat.* 11:541–564, 2014. MR3274645.
27. Nicolas Lanchier. The naming game in language dynamics revisited. *J. Appl. Probab. Spec. Vol.* 51A, 139–158, 2014. MR3317355.
28. Nicolas Lanchier. Evolutionary games on the lattice: payoffs affecting birth and death rates. *Ann. Appl. Probab.* 25:1108–1154, 2015. MR3325270.
29. Nicolas Lanchier and **Nicole Taylor**. Galam’s bottom-up hierarchical system and public debate model revisited. *Adv. Appl. Probab.* 47:668–692, 2015. MR3406603.
30. Nicolas Lanchier and Yuan Zhang. Some rigorous results for the stacked contact process. *ALEA Lat. Am. J. Probab. Math. Stat.* 13:193–222, 2016. MR3476212.
31. **Stephen Evilsizor** and Nicolas Lanchier. Evolutionary games on the lattice: death-birth updating process. *Electron J. Probab.* 21, no. 17, 29 pp, 2016. MR3485359.
32. Nicolas Lanchier and **Paul-Henri Moisson**. Fixation results for the two-feature Axelrod model with a variable number of opinions. *J. Theoret. Probab.* 29:1554–1580, 2016. MR3571254.
33. **Alesandro Arcuri** and Nicolas Lanchier. Stochastic spatial model for the division of labor in social insects. *Math. Models Methods in Appl. Sci.* 27:45–73, 2017. MR3597008.
34. Nicolas Lanchier and **Stylianios Scarlatos**. Limiting behavior for a general class of voter models with confidence threshold. *ALEA Lat. Am. J. Probab. Math. Stat.* 14:63–92, 2017. MR3617451.
35. Nicolas Lanchier. Rigorous proof of the Boltzmann-Gibbs distribution of money on connected graphs. *J. Stat. Phys.* 167:160–172, 2017. MR3619544.
36. **Eric Foxall** and Nicolas Lanchier. Survival and extinction results for a patch model with sexual reproduction. *J. Math. Biol.* 74:1299–1349, 2017. MR3634786.
37. **Eric Foxall** and Nicolas Lanchier. Evolutionary games on the lattice: death and birth of the fittest. *ALEA Lat. Am. J. Probab. Math. Stat.* 14:271–298, 2017. MR3637437.
38. Nicolas Lanchier and **Stephanie Reed**. Rigorous results for the distribution of money on connected graphs. *J. Stat. Phys.* 171:727–743, 2018. MR3790159.
39. Nicolas Lanchier and **Stephanie Reed**. The role of cooperation in spatially explicit economical systems. *Adv. Appl. Probab.* 50:743–758, 2018. MR3877252.
40. Nicolas Lanchier. Local interactions promote cooperation in cooperator-defector systems. *ALEA Lat. Am. J. Probab. Math. Stat.* 16:399–427, 2019. MR3933063.
41. Nicolas Lanchier and **Stephanie Reed**. Rigorous results for the distribution of money on connected graphs (models with debts). *J. Stat. Phys.* 176:1115–1137, 2019. MR3999473.
42. Petar Jevtić, Nicolas Lanchier and **Axel La Salle**. First and second moments of the size distribution of bond percolation clusters on rings, paths and stars. *Statist. Probab. Lett.* 161:108714, 2020. MR4066245.

43. Petar Jevtić and Nicolas Lanchier. Dynamic structural model of loss distribution for cyber risk of small or medium size enterprises for tree based LAN topology. *Insurance: mathematics and economics*. 91:209–223, 2020. MR4067980.
44. **Eric Foxall** and Nicolas Lanchier. Generalized stacked contact process with variable host fitness. To appear in *J. Appl. Probab.*

Recent submissions^{3,4} (as an associate professor at ASU)

45. Petar Jevtić and Nicolas Lanchier. Dynamic structural percolation model of loss distribution for cyber risk or contagious operational failures of smart contracts on random tree-stars graphs.
46. **Shiba Biswal** and Nicolas Lanchier. The simple exclusion process on finite connected graphs. Available as arXiv:1906.01752.
47. **Mela Hardin** and Nicolas Lanchier. Probability of consensus in spatial opinion models with confidence threshold. Available as arXiv:1912.06746.

³All the authors are listed in alphabetic order, which is the convention in mathematics. Co-authors written in bold are the undergraduate students, graduate students and postdocs who worked under my supervision.

⁴Contribution for the 27 articles during associate professorship: 6 single-authored articles, 18 articles co-authored with my students/postdocs for which I am the lead author except paper 44 for which Eric Foxall is the lead author, 1 article with Yuan Zhang for which contributions are roughly equal, 2 papers with Petar Jevtić alone for which Petar wrote motivation and numerical simulations while I wrote the mathematical analysis.

United States provisional patent applications

01. Number: 62/730,649.
Date of submission: September 13, 2018.
Title: Systems and methods for a simulation program of percolation model for the loss distribution caused by a cyber attack.
Inventors: Petar Jevtić and Nicolas Lanchier.
02. Number: 62/779,870.
Date of submission: December 14, 2018.
Title: Systems and methods of a percolation model for the loss distribution caused by a cyber attack or a contagion-like failure of a smart city network.
Inventors: Petar Jevtić, Nicolas Lanchier and Aaron Bergstrom.
03. Number: 62/821,720.
Date of submission: March 21, 2019.
Title: Systems and methods for a dynamic structural percolation model of loss distribution for cyber risk or contagious failure of smart contracts on random tree-stars graphs.
Inventors: Petar Jevtić and Nicolas Lanchier.

Teaching experience (University of Rouen, France)

- 01–02 Measure and Integration, Agrégation in Mathematics
02–03 Functional Analysis, Agrégation in Mathematics
Complex Analysis, 2nd year of Bachelor’s Degree
Linear Algebra, 1st year of Bachelor’s Degree
03–04 Galois Theory, Agrégation in Mathematics
Differential Calculus, 3rd year of Bachelor’s Degree
Real Analysis, 1st year of Bachelor’s Degree
04–05 Linear Algebra, 1st year of Bachelor’s Degree

Teaching experience (Arizona State University, USA ⁵)

	#	Q ₁	Q ₂
07–08 Stochastic Modeling in Biology MAT 598	09	5.00	4.67
Probability Theory STP 421	33	4.79	4.37
Stochastic Modeling in Biology MAT 598	12	5.00	4.72
Individualized Instruction MAT 499 (Benjamin Munyan)			
08–09 Probability Theory STP 421	32	4.89	4.67
Stochastic Modeling in Biology MAT 598	14	5.00	5.00
09–10 Stochastic Modeling in Bio (new course) APM 541	11	4.87	5.00
Probability Theory STP 421	31	5.00	4.81
Probability Theory STP 421	51	4.97	4.69
Honors Directed Study MAT 492 (Jared Neuffer)			
10–11 Stochastic Modeling in Biology APM 541	13	5.00	5.00
Probability Theory STP 421	30	5.00	4.91
Honors Thesis MAT 493 (Jared Neuffer)			
Stochastic Processes STP 425	30	4.93	4.79
Reading and conference MAT 590 (Tacker Frink)			
11–12 Probability Theory STP 421	35	4.80	4.80
Honors Directed Study MAT 492 (Andrew Sannier)			
Honors Directed Study MAT 492 (Kenneth Qian)			
Reading and conference MAT 590 (Andrew Fraijo)			
Stochastic Processes STP 425	36	4.92	4.92
Probability Theory STP 421	48	4.78	4.74
Honors Thesis MAT 493 (Andrew Sannier)			
Honors Thesis MAT 493 (Kenneth Qian)			
12–13 Stochastic Modeling in Biology APM 541	16	4.85	4.92
Probability Theory STP 421	37	4.95	4.80
Honors Directed Study MAT 492 (Nicole Taylor)			

	Honors Directed Study MAT 492 (Yili Yu)			
	Honors Directed Study MAT 492 (Austin Wehn)			
	Stochastic Processes STP 425	31	4.87	4.73
	Probability Theory STP 421	49	4.79	4.50
	Honors Thesis MAT 493 (Nicole Taylor)			
	Honors Thesis MAT 493 (Yili Yu)			
13-14	Stochastic Processes STP 425	30	5.00	5.00
	Research MAT 792 (Stephen Evilsizor)			
	Honors Thesis MAT 493 (Austin Wehn)			
	Stochastic Processes STP 425	30	4.83	4.83
	Probability Theory STP 421	47	5.00	5.00
	Research APM 792 (Stephen Evilsizor)			
14-15	Stochastic Modeling in Biology APM 541	15	5.00	5.00
	Stochastic Processes STP 425	12	5.00	5.00
	Honors Directed Study MAT 492 (Alesandro Arcuri)			
	Research APM 792 (Stephen Evilsizor)			
	Honors Thesis MAT 493 (Alesandro Arcuri)			
	Individualized Instruction MAT 499 (JoBeth Green)			
	Research APM 792 (Stephen Evilsizor)			
15-16	Stochastic Modeling in Biology APM 541	17	4.92	4.92
	Probability Theory STP 421	45	4.94	4.94
	Research APM 792 (Stephen Evilsizor)			
	Probability theory APM 504	27	4.89	5.00
	Dissertation APM 799 (Stephen Evilsizor)			
	Honors Directed Study MAT 492 (Maxwell VanKirk)			
	Research APM 792 (Stephanie Reed)			
16-17	Stochastic Processes STP 425	35	4.87	5.00
	Probability Theory STP 421	37	4.92	5.00
	Research APM 792 (Stephanie Reed)			
	Honors Thesis STP 493 (Maxwell VanKirk)			
	Probability theory APM 504	31	5.00	4.94
	Research APM 792 (Stephanie Reed)			
	Reading and conference MAT 590 (Marion Badal)			
	Research APM 792 (Stephanie Reed)			
17-18	Stochastic Modeling in Biology APM 541	21	4.92	4.83
	Probability Theory STP 421	44	5.00	4.94
	Research APM 792 (Stephanie Reed)			
	Probability theory APM 504	19	5.00	5.00
	Research APM 792 (Stephanie Reed)			
	Research APM 792 (Mela Hardin)			

	Individualized Instruction STP 499 (Humberto Parra)			
	Research APM 792 (Stephanie Reed)			
18–19	Stochastic Processes STP 425	16	4.78	4.89
	Research APM 792 (Stephanie Reed)			
	Research APM 792 (Mela Hardin)			
	Dissertation APM 799 (Stephanie Reed)			
	Probability theory APM 504	29	5.00	5.00
	Research APM 792 (Stephanie Reed)			
	Research APM 792 (Mela Hardin)			
	Reading and conference MAT 590 (Shiba Biswal)			
	Research APM 792 (Axel La Salle)			
19–20	Stochastic Modeling in Biology APM 541	11	5.00	5.00
	Probability Theory STP 421	47	5.00	4.85
	Research APM 792 (Mela Hardin)			
	Probability theory APM 504	27		
	Research APM 792 (Mela Hardin)			
	Research APM 792 (Axel La Salle)			
	Research MAT 792 (Hsin-Lun Li)			
	Reading and conference MAT 590 (Axel La Salle)			

⁵The three numbers on the right of each general course taught at ASU refer to the number of students enrolled, and official teaching evaluations using a 1-5 scale based on the students' answers regarding (Q_1) their confidence in the instructor's knowledge of the subject, and (Q_2) their overall rating of the instructor.

Recorded lectures posted as YouTube videos

I recorded 50 videos of my lectures in Spring 2020 in order to teach remotely during the coronavirus pandemic. Here is the list of the most relevant YouTube videos:

- P1. Playlist on discrete-time Markov chains (21 videos).
- 1A. [29:36] Multistep transition probabilities and Chapman-Kolmogorovs equations.
 - 1B. [15:49] Transition probabilities example (the Ehrenfest model).
 - 1C. [16:24] Multistep transition probabilities example (cars and trucks).
 - 2A. [25:42] Communication classes and irreducibility.
 - 3A. [39:28] Recurrence and transience.
 - 3B. [21:21] Recurrence and transience example (one-dimensional random walk).
 - 3C. [29:32] Recurrence and transience example (two-dimensional random walk).
 - 4A. [34:39] Stationary distribution.
 - 4B. [25:18] Stationary distribution example (switching coins).
 - 4C. [18:10] Doubly stochastic Markov chains + example (rolling dice).
 - 4D. [18:33] Time-reversible Markov chains + example (symmetric random walk).
 - 5A. [64:59] Positive recurrence and existence of a stationary distribution.

- 5B. [18:02] Mean recurrence time example (expected number of levels in a game).
 - 5C. [23:54] Mean recurrence time example (time between movies).
 - 5D. [14:35] Fraction of time spent in a state example (taxi driver).
 - 6A. [45:18] Aperiodicity and limiting probabilities.
 - 6B. [23:51] Period example (random walk on the polygons and Platonic solids).
 - 6C. [40:56] Limiting probabilities example (probability of getting wet).
 - 6D. [23:23] Limiting probabilities example (distribution of black/red balls).
 - CC. [27:30] Conclusion and complete overview.
 - BP. [56:31] Bonus: Distribution of money on social networks (with Stephanie Reed).
- P2. Playlist on random walks (5 videos).
- 01. [16:52] Symmetric random walk on finite connected graphs.
 - 02. [27:48] Symmetric random walk in one dimension.
 - 03. [19:33] Symmetric random walk in two dimensions.
 - 04. [14:12] Symmetric random walk on the polygon.
 - 05. [15:55] Asymmetric random walk in one dimension.
- P3. Playlist on Poisson processes (8 videos).
- 01. [27:12] Poisson (point) processes and the exponential distribution.
 - 02. [34:45] Superposition and thinning properties.
 - 03. [21:30] Memoryless property (time to cross the street).
 - 04. [28:52] The minimum spanning tree problem.
 - 05. [20:41] How to maximize the profit with an exponentially distributed demand?
 - 06. [37:08] Time spent waiting in line.
 - 07. [23:52] Number of people in line when a given customer leaves.
 - 08. [21:36] The generalized coupon collector's problem.
- P4. Playlist on continuous-time Markov chains (5 videos).
- 01. [22:48] Fraction of time spent in a state example (frog and ladder).
 - 02. [13:03] Fraction of time spent in a state example (particle on a polygon).
 - 03. [17:30] Fraction of time spent in a state example (taxi station).
 - 04. [17:33] Expected time to connect two states example (crossing the street).
 - 05. [21:32] Existence of a stationary distribution example (queueing system).
- P5. Playlist on the classics in probability theory (2 videos).
- 01. [15:16] The game of craps is not a fair game.
 - 02. [14:14] The birthday problem: Why we all have it wrong?

Mentoring Ph.D. students and postdocs

- Doctoral Dissertation Advisor, **Stephen Evilsizor**, 2013–2016.
- Postdoc Mentor, **Stylianos Scarlatos**, 2014–2015.

- Postdoc Mentor, **Eric Foxall**, 2015–2017
- Doctoral Dissertation Advisor, **Stephanie Reed**, 2016–2019.
- Doctoral Dissertation Advisor, **Mela Hardin**, 2017–present.
- Doctoral Dissertation Advisor, **Axel La Salle**, 2019–present.
- Doctoral Dissertation Advisor, **Hsin-Lun (Steph) Li**, 2020–present.

Mentoring Master’s students

- Masters Thesis Advisor, **Andrew Fraijo**, 2011–2012.
- Masters Thesis Advisor, **Paul-Henri Moisson**, Summer 2014.
- Masters Portfolio project, **Brian Sweeney**, Spring 2020.
- Masters Portfolio project, **Mason Manning**, Spring 2020.

Mentoring undergraduate students

- Individualized Instruction, **Benjamin Munyan**, Spring 2008.
- Summer Research Project Advisor, **William Feliciano**, Summer 2009.
- Summer Research Project Advisor, **Ashley Robison**, Summer 2009.
- Honors Thesis Advisor, **Jared Neuffer**, 2010–2011.
- Honors Thesis Advisor, **Andrew Sannier**, 2011–2012.
- Honors Thesis Advisor, **Kenneth Qian**, 2011–2012.
- Honors Thesis Advisor, **Nicole Taylor**, 2012–2013.
- Honors Thesis Advisor, **Yili Yu**, 2012–2013.
- Honors Thesis Advisor, **Austin Wehn**, 2012–2013.
- Honors Thesis Advisor, **Alesandro Arcuri**, 2014–2015.
- Individualized Instruction, **JoBeth Green**, Spring 2015.
- Honors Thesis Co-Advisor (with Eric Foxall), **Maxwell VanKirk**, 2015–2016.
- Individualized Instruction, **Humberto Parra**, Spring 2018.

Exam committees

- Member of the MAT 598 Comprehensive Exam Committee (1 student), Spring 2007.
David Tello.
- Member of the STP 421 Qualifying Exam Committee, Fall 2007.
- Member of the STP 421 Qualifying Exam Committee, Spring 2008.
- Member of the STP 421 Qualifying Exam Committee, Fall 2008.
- Member of the STP 421 Qualifying Exam Committee, Fall 2009.

- Chair of the APM541 Comprehensive Exam Committee (1 student), Fall 2014.
Stephen Evilsizor.
- Chair of the APM541 Comprehensive Exam Committee (1 student), Fall 2016.
Marisabel Rodriguez.
- Chair of the APM541 Comprehensive Exam Committee (4 students), Fall 2017.
Michael Culp, Lifeng Han, Mela Hardin, Stephanie Reed.
- Member of the ACT561 Comprehensive Exam Committee (1 student), Fall 2019.
Palak Jain.
- Chair of the APM541 Comprehensive Exam Committee (2 students), Fall 2019.
Axel La Salle, Atta Ullah.
- Chair of the APM541 Comprehensive Exam Committee (1 student), Spring 2020.
Hsin-Lun Li.
- Chair of the MAT590 Comprehensive Exam Committee (1 student), Spring 2020.
Axel La Salle.
- Member of the STP527 Comprehensive Exam Committee (1 student), Spring 2020.
Hsin-Lun Li.

Reading courses

- Reading and Conference, **Tacker Frink**, Spring 2011.
Topic: Stochastic spatial opinion models.
- Reading and Conference, **Andrew Fraijo**, Fall 2011.
Topic: Percolation theory and particle systems.
- Reading and Conference, **Marion Badal**, Spring 2017.
Topic: Stochastic processes.
- Reading and Conference, **Shiba Biswal**, Spring 2019.
Topic: Interacting particle systems.
- Reading and Conference, **Axel La Salle**, Spring 2020.
Topic: Bond percolation on finite graphs.

Other mentoring

- Doctoral Dissertation External Reviewer, **Joseph Stover**, Spring 2008.
- Masters Thesis Committee Member, **Kamal Barley**, Spring 2008.
- Masters Thesis Committee Member, **Christopher Person**, Spring 2009.
- Doctoral Dissertation Committee Member, **Kevin Flores**, Fall 2009.
- Doctoral Dissertation Committee Member, **Michael Manley**, Fall 2010.
- Masters Thesis Committee Member, **Angela Peace**, Summer 2011.

- Honors Thesis Committee Member (second reader), **Kevin Coltin**, Spring 2012.
- Honors Thesis Committee Member (third reader), **Eric Stout**, Spring 2012.
- Doctoral Dissertation Committee Member, **Chester Ismay**, Summer 2013.
- Doctoral Dissertation Committee Member, **Hao Liu**, Fall 2013.
- Masters Thesis Committee Member, **Huy Dinh**, Fall 2014.
- Honors Thesis Committee Member (second reader), **Peter Chotras**, Spring 2015.
- Honors Thesis Committee Member (second reader), **Talia Davis**, Fall 2015.
- Masters Thesis Committee Member, **Lorenzo Tapia**, Spring 2016.
- Honors Thesis Committee Member (second reader), **Katherine Kincade**, Fall 2016.
- Honors Thesis Committee Member (second reader), **Austin Trent**, Spring 2018.
- Doctoral Dissertation Committee Member, **Robert Buscaglia**, Spring 2018.
- Masters Thesis Committee Member, **Ryan Theisen**, Fall 2018.
- Honors Thesis Committee Member (second reader), **Nicholas Buckley**, Spring 2019.
- Doctoral Dissertation Committee Member, **Shiba Biswal**, Spring 2020.
- Doctoral Dissertation Committee Member, **Kyran Cupido**, Spring 2020.
- Doctoral Dissertation Committee Member, **Fei Cao**, current.
- Doctoral Dissertation Committee Member, **Corey Reutlinger**, current.
- Doctoral Dissertation Committee Member, **Kathryn Wifvat**, current.
- Doctoral Dissertation Committee Member, **Atta Ullah**, current.

TALKS AT SEMINARS AND CONFERENCES

Invited talks

- 03/05 Seminar of the Department of Mathematics at the University of Marseille, France. Talk: Stochastic spatial models of host-pathogen and host-mutualist interactions.
- 06/06 Probability Seminar of the University of Orléans, France. Talk: Stochastic spatial models of host-symbiont interactions: Static and dynamic environments.
- 03/07 Workshop on the Mathematics of Global Public Health, Arizona State University, USA. Talk: Individual versus cluster recoveries on social networks.
- 06/08 Second Congress Canada-France, Montreal, Canada. Talk: Survival and coexistence in spatially explicit metapopulations.
- 03/09 Probability Seminar, University of California in San Diego, USA. Talk: Coexistence in spatially explicit metapopulations.
- 07/09 33rd conference on Stochastic Processes and Their Applications, Berlin, Germany. Talk: Coexistence in spatially explicit metapopulations.

- 11/09 XI Congreso Latinoamericano de Probabilidad y Estadística Matemática, Caracas, Venezuela. Talk: Coexistence in spatially explicit metapopulations.
- 05/10 38th Annual Meeting of the Statistical Society of Canada, Quebec City, Canada. Talk: Geometric properties of the spatial majority rule model.
- 10/10 AMS meeting at the University of California in Los Angeles, USA. Talk: Geometric properties of the spatial majority rule model.
- 03/11 Workshop of the Statistical and Applied Mathematical Sciences Institute, USA. Talk: The Axelrod model for the dissemination of culture revisited.
- 04/11 Iowa State University Mathematics Colloquium, USA. Talk: The Axelrod model for the dissemination of culture revisited.
- 05/11 Workshop in Probability and Discrete Mathematics in Mathematical Biology at the Institute for Mathematical Sciences, Singapore. Talk: The Axelrod model for the dissemination of culture revisited.
- 05/11 Seminar of the Institute for Mathematical Sciences, Singapore. Talk: Stochastic dynamics on hypergraphs and the majority rule.
- 07/11 Seminar of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: The Axelrod model for the dissemination of culture revisited.
- 07/11 Seminar of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Stochastic dynamics on hypergraphs and the majority rule.
- 09/11 Iowa State University Mathematics Colloquium, USA. Talk: Two-strategy games on the lattice.
- 11/11 Colloquium of the School of Geographical Sciences and Urban Planning at Arizona State University, USA. Talk: Two-strategy games on the lattice.
- 04/12 Workshop in Spatial Models of Micro and Macro Systems at the Mathematical Biosciences Institute, Ohio State University, USA. Talk: Two-strategy games on the lattice.
- 06/12 Summer Graduate Workshop on Stochastics Applied to Biological Systems at the Mathematical Biosciences Institute, Ohio State University, USA. Talks: Overview of the voter model (3 hours) and Flux and fixation in the Axelrod model (3 hours).
- 07/12 Seminar of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Flux and fixation in the one-dimensional Axelrod model.
- 07/12 Advanced lecture of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Overview of the voter model.
- 10/12 AMS meeting at the University of Arizona, USA. Talk: Stochastic spatial model of producer-consumer systems on the lattice.
- 01/13 Applied Mathematics Colloquium and Mathematical Physics Seminar at the University of Arizona, USA. Talk: Fluctuation and fixation in the one-dimensional Axelrod model.
- 02/13 Workshop in Kinetic Theory for the Emergence of Complex Behavior in Social and Economic Systems at Arizona State University, USA. Talk: Fluctuation and fixation in the one-dimensional Axelrod model.

- 06/13 Advanced lecture of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Poisson point processes and the exponential random variable.
- 06/13 Advanced lecture of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Evolutionary games on the lattice.
- 02/14 Seminar of the School of Letters and Sciences at Arizona State University, USA. Talk: Fluctuation versus fixation in the constrained voter model.
- 06/14 Eighth International Conference on Recent Advances in Applied Dynamical Systems, Guilin, China. Talk: Fluctuation versus fixation in the constrained voter model.
- 06/14 Mathematics seminar of the College of Mathematics and Information Science, Wenzhou University, China. Talk: Fluctuation versus fixation in the Axelrod model.
- 06/14 Mathematics seminar at Zhejiang University of Science and Technology, China. Talk: Fluctuation versus fixation in the Axelrod model.
- 06/14 Advanced lecture of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Overview of the standard and constrained voter models.
- 07/14 Institute of Mathematical Statistics Annual Meeting 2014, Sydney, Australia. Talk: Fluctuation versus fixation in the constrained voter model.
- 07/14 Colloquium of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Fluctuation versus fixation in the Axelrod model.
- 07/14 37th conference on Stochastic Processes and Their Applications, Buenos Aires, Argentina. Talk: Fluctuation versus fixation in the constrained voter model.
- 01/15 Joint Mathematics Meetings 2015, San Antonio, Texas. Talk: Consensus and disagreements in the Axelrod model for the dissemination of culture.
- 03/15 AMS meeting at Michigan State University, USA. Talk: Fluctuation and fixation in the Axelrod model with a variable number of opinions.
- 06/15 Advanced lecture of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Evolutionary games on the lattice: best-response dynamics.
- 06/15 Advanced lecture of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Fluctuation and fixation in the Axelrod model with a variable number of opinions.
- 07/15 Conference on Mathematical Models in Ecology and Evolution, Collège de France, France. Talk: Evolutionary games on the lattice: best-response dynamics.
- 05/16 Mathematical Biology seminar at the University of Pennsylvania, USA. Talk: Fluctuation and fixation in the Axelrod model with a variable number of opinions.
- 07/16 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, Florida, USA. Talk: Evolutionary games on the lattice: death-birth updating process.
- 07/16 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, Florida, USA. Talk: Evolutionary games on the lattice: best-response dynamics.

- 08/16 Seminar of the Math Club at Arizona State University, USA. Talk: Limiting behavior for a general class of voter models with confidence threshold.
- 10/17 Biological Design Seminar at Arizona State University, USA. Talk: Rigorous proof of two conjectures for the distribution of money.
- 01/18 Seminar of the Math Club at Arizona State University, USA. Talk: Rigorous proof of two conjectures for the distribution of money.

Contributed talks

- 05/03 Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Phase transitions for an ecological succession model.
- 06/03 Workshop on Probability of the University of Rouen, France. Talk: Phase transitions for an ecological succession model.
- 07/03 Probability Summer School of the University of Prague, Czech Republic. Talk: Phase transitions for an ecological succession model.
- 12/03 Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Phase transitions for the multitype contact process with frozen sites.
- 06/04 Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Interacting particle systems and spatial structures.
- 03/05 Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Continuity result for multicolor particle systems.
- 04/05 Probability Seminar of the Vincent Hall, University of Minnesota, USA. Talk: Continuity result for multicolor particle systems.
- 06/05 Workshop on Probability of the University of Rouen, France. Talk: Stochastic spatial models of host-pathogen and host-mutualist interactions.
- 07/05 First Cornell Probability Summer School, Cornell University, USA. Talk: Individual versus cluster recoveries on a lattice of social clusters.
- 09/05 Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Competition among specialists and generalists in a heterogeneous environment.
- 01/06 Probability Seminar at Cornell University, USA. Talk: Stochastic spatial models of host-symbiont interactions: Static and dynamic environments.
- 11/06 Probability Seminar of the Vincent Hall, University of Minnesota, USA. Talk: Host-symbiont interactions in static and dynamic environments.
- 09/07 Mathematical Biology seminar at Arizona State University, USA. Talk: Survival (and coexistence) in spatially explicit metapopulations.
- 05/09 Workshop in “Deterministic and stochastic spatial modeling in population biology”, Palo Alto, USA. Talk: Theoretical framework to model interacting populations.
- 09/09 Mathematical Biology seminar at Arizona State University, USA. Talk: Coexistence in spatially explicit stochastic models.

- 10/10 Probability seminar at Arizona State University, USA. Talk: Stochastic dynamics on hypergraphs and the majority rule.
- 08/11 Mathematical Biology seminar at Arizona State University, USA. Talk: Two-strategy games on the lattice.
- 02/12 Probability seminar at Arizona State University, USA. Talk: Spatial evolutionary games.
- 10/12 Mathematical Biology seminar at Arizona State University, USA. Talk: Flux and fixation in the one-dimensional Axelrod model.
- 02/13 Seminar of the Computational Science Training for Undergraduates in the Mathematical Sciences, Arizona State University, USA. Talk: Evolutionary games on the lattice.
- 10/13 Mathematical Biology seminar at Arizona State University, USA. Talk: Fluctuation versus fixation in the constrained voter model.
- 01/15 Mathematical Biology seminar at Arizona State University, USA. Talk: Fluctuation and fixation in the Axelrod model with a variable number of opinions.
- 08/16 Mathematical Biology seminar at Arizona State University, USA. Talk: Limiting behavior for a general class of voter models with confidence threshold.
- 09/19 Mathematical Biology seminar at Arizona State University, USA. Talk: Distribution of money for the uniform reshuffling and the immediate exchange models.
- 11/19 Discrete math seminar at Arizona State University, USA. Talk: Limiting behavior for a general class of voter models with confidence threshold.

Other presentations

- 09/13 Talk for the class of Kindergarten at the Arizona State University Preparatory Academy, USA. Talk: Mathematics: numbers and shapes.
- 04/15 Math Awareness Day, Arizona State University, USA. Talk: Poker probabilities and the handshake problem.
- 05/19 Volunteer at the 2019 STEM Santa Fe Julia Robinson Mathematics Festival, Española, New Mexico. Topic: The magic square.

PROFESSIONAL SERVICE

Review and referee activities

- Referee for journals in probability and mathematical biology (65 articles since 2005).
 - Journal of Statistical Physics (10 articles)
 - Annals of Applied Probability (9 articles)
 - Journal of Theoretical Biology (6 articles)
 - Journal of Mathematical Biology (5 articles)
 - Journal of/Advances in Applied Probability (4 articles)

- Mathematical Biosciences and Engineering (4 articles)
 - Electronic Journal of Probability (3 articles)
 - Probability Theory and Related Fields (2 articles)
 - Latin American Journal of Probability and Mathematical Statistics (2 articles)
 - Stochastic Processes and Their Applications (2 articles)
 - Acta Mathematica Scientia (2 articles)
 - Random Structures and Algorithms (2 articles)
 - Journal of Statistical Mechanics: Theory and Experiment (2 articles)
 - Acta Applicanda Mathematicae (1 article)
 - Proceedings of the National Academy of Sciences (1 article)
 - Proceedings of the Royal Society A (1 article)
 - Evolution (1 article)
 - SIAM Journal on Applied Mathematics (1 article)
 - Theoretical Population Biology (1 article)
 - Physica A (1 article)
 - Mathematical Methods in the Applied Sciences (1 article)
 - International Journal of Nonlinear Sciences and Numerical Simulation (1 article)
 - Complexity (1 article)
 - Mathematical Population Studies (1 article)
 - PLOS ONE (1 article)
- Book reviews: Lecture Notes in Mathematics (1 book).

Math reviews

- Reviewer for *Mathematical Reviews* (47 reviews since 2006).
 - 3 reviews for articles published in 2006
 - 6 reviews for articles published in 2007
 - 5 reviews for articles published in 2008
 - 3 reviews for articles published in 2009
 - 3 reviews for articles published in 2010
 - 6 reviews for articles published in 2011
 - 2 reviews for articles published in 2012
 - 3 reviews for articles published in 2013
 - 4 reviews for articles published in 2016
 - 3 reviews for articles published in 2017
 - 5 reviews for articles published in 2018
 - 3 reviews for articles published in 2019
 - 1 review for articles published in 2020

Committees

- Member of the Awards Committee, 2007–2008.
- Member of the Probability Hiring Committee, 2008–2009.
- Member of the Probability and Statistics Hiring Committee, 2009–2010.
- Member of the Research Assistant Professor Hiring Committee, 2013–2014.
- Member of the Mathematics Colloquium Committee, 2013–2014.
- Member of the SoMSS Advisory Committee on Statistics, 2013–2014.
- Organizer of the probability seminar, 2013–2014.
- Member of the Promotion and Tenure Committee (Jesse Taylor), 2014–2015.
- Member of the Actuarial Lecturer Hiring Committee, 2014–2015.
- Member of the Personnel and Budget Committee, 2015–2016.
- Chair of the Promotion and Tenure Committee (Vladislav Vysotsky), 2015–2016.
- Member of the Research Assistant Professor Hiring Committee, 2015–2016.
- Chair of the Postdoc Hiring Committee, 2016–2017.
- Member of the Executive Committee, 2016–2018.
- Member of the Ombuds Committee, 2016–2018.
- Member of the Postdoc Hiring Committee, 2017–2018.
- Member of the Postdoc Hiring Committee, 2018–2019.
- Member of the Executive Committee, 2019–2021.
- Member of the Ombuds Committee, 2020–2021.

Evaluation work

- Panelist for the National Science Foundation in 2010.
- Reviewer for grant proposals.
 - National Security Agency (1 proposal in 2010)
 - National Security Agency (1 proposal in 2015)
 - Netherlands Organisation for Scientific Research (1 proposal in 2016)
 - NRD Office of Hungary (1 proposal in 2017)
- Peer teaching evaluations.
 - Petar Jevtić, ACT 560, Fall 2018.
 - Marko Samara, STP 421, Fall 2018.
 - Petar Jevtić, ACT 561, Spring 2020.
- TA teaching evaluations.
 - Axel La Salle, MAT 270, Fall 2019.

– Recommendation letters for 44 students and postdocs.

- Benjamin Munyan, 2008.
- William Feliciano, 2009.
- Ananda Majumdar, 2009.
- Jared Neuffer, 2010.
- Feng Cheng, 2011.
- Tacker Frink, 2011.
- Andrew Karl, 2011.
- Adam Leighton, 2011-2012.
- Kenneth Qian, 2011.
- Na Zhang, 2011.
- Shawn Alexander, 2012.
- Kevin Coltin, 2012.
- Mack Kerker, 2012.
- Eric Stout, 2012.
- Eric Van Buren, 2012.
- Maria van Schaijik, 2012.
- Lulu Wang, 2012.
- Liqiu Deng, 2013.
- Stylianos Scarlatos, 2013-2016.
- Nicole Taylor, 2013.
- Austin Wehn, 2013.
- Alesandro Arcuri, 2014.
- Stephen Evilsizor, 2014-2015.
- Eric Foxall, 2014-2018.
- Jayson Martin, 2014.
- Justin Sanders, 2014.
- Achilleas Tzioufas, 2014-2020.
- Yili Yu, 2014.
- Aaron Baker, 2015.
- Gianmarco Caldini, 2016.
- Stephanie Reed, 2016-2019.
- Shiba Biswal, 2017-2020.
- Paul-Henri Moisson, 2017.
- Qiantong Liu, 2017.
- Sarah El Jamous, 2018.
- Mela Hardin, 2018-2019.
- Haoyu Liu, 2018.
- Jiawei Wu, 2018.

- Axel La Salle, 2019.
- Zhicheng Liu, 2019.
- Benjamin Muhlmann, 2019.
- Hsin-Lun Li, 2020.
- Haoran Shi, 2020.
- Atta Ullah, 2020.