

Curriculum Vitae

Name: Nicolas Lanchier
Address: School of Mathematical and Statistical Sciences
Arizona State University, Tempe, AZ 85287, USA.
E-mail : nicolas.lanchier@asu.edu
Web page : <http://math.la.asu.edu/~lanchier>

Employments

- 2007 - — Assistant professor in Mathematics, 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.

Education

- 2002 - 2005 Ph.D. in Mathematics under the supervision of Claudio Landim, and Teaching Assistant at the University of Rouen, France.
- 2001 - 2002 DEA (Diploma of Advanced Studies, 2nd year of Master's Degree) analysis and stochastic models, Mention très bien (Magna Cum Laude), University of Rouen, France.
- 2000 - 2001 Agrégation de Mathématiques (nationwide competition).
- 1999 - 2000 Maîtrise in Mathematics (1st year of Master's Degree), Mention très bien (Magna Cum Laude), University of Rouen, France.
- 1998 - 1999 Licence in Mathematics (3rd year of Bachelor's Degree), Mention très bien (Magna Cum Laude), University of Rouen, France.

Note: In France, the Agrégation de Mathématiques is the most prestigious nationwide competition selecting people on their ability to teach. Topics covered are group theory, field theory, arithmetic, linear and 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, thus leaving out any spatial structure. The spatial component, however, is identified as an important factor in how communities are shaped, and spatial models can result in predictions that differ from their nonspatial counterparts. The aim of my research is to understand the role of space in ecology, epidemiology, population genetics, opinion dynamics, cultural dynamics and evolutionary game theory through the mathematical analysis of a class of stochastic processes known as interacting particle systems. These processes are ideally suited to investigate the consequences of the inclusion of a spatial structure in the form of stochastic and local interactions. This includes generalizations of the contact process and the voter model in spatially heterogeneous environments but also on inhomogeneous graphs, hypergraphs, and dynamic graphs.

Publications and Preprints

Peer-Reviewed Publications

1. N. Lanchier. The Axelrod model for the dissemination of culture revisited. To appear in *Ann. Appl. Probab.*
2. Y. Kang and N. Lanchier. The role of space in the exploitation of resources. *Bull. Math. Biol.*, 74:1–44, 2012.
3. D. Bertacchi, N. Lanchier and F. Zucca. Contact and voter processes on the infinite percolation cluster as models of host-symbiont interactions. *Ann. Appl. Probab.*, 21:1215–1252, 2011.
4. N. Lanchier. Contact process with destruction of cubes and hyperplanes: forest fires versus tornadoes. *J. Appl. Probab.*, 48:352–365, 2011.
5. N. Lanchier. Two-scale multitype contact process: coexistence in spatially explicit metapopulations. *Markov Process. Related Fields*, 17:151–186, 2011.
6. Y. Kang and N. Lanchier. Expansion or extinction: deterministic and stochastic two-patch models with Allee effects. *J. Math. Biol.*, 62:925–973, 2011.
7. N. Lanchier and C. Neuhauser. Stochastic spatial models of host-pathogen and host-mutualist interactions II. *Stoch. Models*, 26:399–430, 2010.
8. N. Lanchier. Opinion dynamics with confidence threshold: an alternative to the Axelrod model. *ALEA Lat. Am. J. Probab. Math. Stat.*, 7:1–18, 2010.
9. B. Chan, R. Durrett and N. Lanchier. Coexistence for a multitype contact process with seasons. *Ann. Appl. Probab.*, 19:1921–1943, 2009.
10. N. Lanchier and C. Neuhauser. Spatially explicit non-Mendelian diploid model. *Ann. Appl. Probab.*, 19:1880–1920, 2009.
11. L. Belhadji and N. Lanchier. Two-scale contact process and effects of habitat fragmentation on metapopulations. *Markov Process. Related Fields*, 14:487–514, 2008.
12. R. Durrett and N. Lanchier. Coexistence in host-pathogen systems. *Stochastic Process. Appl.*, 118:1004–1021, 2008.
13. N. Lanchier and C. Neuhauser. Voter model and biased voter model in heterogeneous environments. *J. Appl. Probab.*, 44:770–787, 2007.
14. N. Lanchier and C. Neuhauser. A spatially explicit model for competition among specialists and generalists in a heterogeneous environment. *Ann. Appl. Probab.*, 16(3):1385–1410, 2006.
15. N. Lanchier and C. Neuhauser. Stochastic spatial models of host-pathogen and host-mutualist interactions I. *Ann. Appl. Probab.*, 16(1):448–474, 2006.
16. L. Belhadji and N. Lanchier. Individual versus cluster recoveries within a spatially structured population. *Ann. Appl. Probab.*, 16(1):403–422, 2006.
17. N. Lanchier. A multitype contact process with frozen sites: a spatial model of allelopathy. *J. Appl. Probab.*, 42(4):1109–1119, 2005.
18. N. Lanchier. Phase transitions and duality properties of a successional model. *Adv. Appl. Probab.*, 37(1):265–278, 2005.

Recent Submissions

19. N. Lanchier. The critical value of the Deffuant model is equal to one half.

20. N. Lanchier and J. Schweinsberg. Consensus in the two-state Axelrod model.
21. N. Lanchier. Two-strategy games on the lattice.
22. N. Lanchier and J. Neuffer. Stochastic dynamics on hypergraphs and the spatial majority rule model.

Research Grants

- 2010 - 2013 NSF Grant in probability theory DMS-10-05282 (\$178,576) Stochastic processes on hypergraphs and dynamic graphs (sole PI).
- Grant from the American Institute of Mathematics to organize the workshop “Deterministic and stochastic spatial modeling in population biology”, Palo Alto CA, 2009 (co-PI).

Teaching experience

Teaching at the University of Rouen, France, as Teaching Assistant

- | | |
|-------------|--|
| Spring 2002 | Measure and Integration Theory, Agrégation in Mathematics. |
| Spring 2003 | Topology and Functional Analysis, Agrégation in Mathematics.
Complex Analysis, 2nd year of Bachelor’s Degree.
Linear Algebra, 1st year of Bachelor’s Degree. |
| Fall 2003 | Galois Theory, Agrégation in Mathematics.
Differential Calculus, 3rd year of Bachelor’s Degree.
Real Analysis, 1st year of Bachelor’s Degree. |
| Spring 2005 | Linear Algebra, 1st year of Bachelor’s Degree. |

Teaching at the Arizona State University, USA, as Assistant Professor

- | | | |
|-------------|---------|---|
| Fall 2007 | MAT 598 | Stochastic Modeling in Biology (with Cindy Greenwood). |
| | STP 421 | Probability Theory for undergraduate students. |
| Spring 2008 | MAT 598 | Stochastic Modeling in Biology (with Cindy Greenwood). |
| | MAT 494 | From measure theory to stochastic processes (reading course). |
| Fall 2008 | STP 421 | Probability Theory for undergraduate students. |
| Spring 2009 | MAT 598 | Stochastic Modeling in Biology (with Cindy Greenwood). |
| Fall 2009 | APM 541 | Stochastic Modeling in Biology (new course). |
| | STP 421 | Probability Theory for undergraduate students. |
| Spring 2010 | STP 421 | Probability Theory for undergraduate students. |
| Fall 2010 | APM 541 | Stochastic Modeling in Biology. |
| | STP 421 | Probability Theory for undergraduate students. |
| | MAT 492 | Honors Directed Study (Jared Neuffer). |
| Spring 2011 | STP 425 | Stochastic Processes for undergraduate students. |
| | MAT 590 | Stochastic spatial opinion models (reading course). |

Fall 2011	STP 421	Probability Theory for undergraduate students.
	MAT 492	Honors Directed Study (Andrew Sannier).
	MAT 590	Percolation theory and particle systems (reading course).
Spring 2012	STP 425	Stochastic Processes for undergraduate students.
	STP 421	Probability Theory for undergraduate students.

Seminars and conferences

- Nov 11 Invited speaker, Colloquium of the School of Geographical Sciences and Urban Planning at Arizona State University, USA. Talk: Two-strategy games on the lattice.
- Sept 11 Invited speaker, Iowa State University Mathematics Colloquium, USA. Talk: Two-strategy games on the lattice.
- Aug 11 Speaker, Mathematical Biology seminar at Arizona State University, USA. Talk: Two-strategy games on the lattice.
- Jul 11 Invited speaker, Seminar of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: Stochastic dynamics on hypergraphs and the majority rule.
- Jul 11 Invited speaker, Seminar of the Mathematical and Theoretical Biology Institute at Arizona State University, USA. Talk: The Axelrod model for the dissemination of culture revisited.
- May 11 Invited speaker, Seminar of the Institute for Mathematical Sciences, Singapore. Talk: Stochastic dynamics on hypergraphs and the majority rule.
- May 11 Invited speaker, 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.
- Apr 11 Invited speaker, Iowa State University Mathematics Colloquium, USA. Talk: The Axelrod model for the dissemination of culture revisited.
- Mar 11 Invited speaker, Workshop of the Statistical and Applied Mathematical Sciences Institute, USA. Talk: The Axelrod model for the dissemination of culture revisited.
- Oct 10 Speaker, Probability seminar at Arizona State University, USA. Talk: Stochastic dynamics on hypergraphs and the majority rule.
- Oct 10 Invited speaker, AMS meeting at the University of California in Los Angeles, USA. Talk: Geometric properties of the spatial majority rule model.
- May 10 Invited speaker, 38th Annual Meeting of the Statistical Society of Canada, Quebec City, Canada. Talk: Geometric properties of the spatial majority rule model.
- Nov 09 Invited speaker, XI Congreso Latinoamericano de Probabilidad y Estadística Matemática, Caracas, Venezuela. Talk: Coexistence in spatially explicit metapopulations.
- Sept 09 Speaker, Mathematical Biology seminar at Arizona State University, USA. Talk: Coexistence in spatially explicit stochastic models.
- Jul 09 Invited speaker, 33rd conference on Stochastic Processes and Their Applications, Berlin, Germany. Talk: Coexistence in spatially explicit metapopulations.
- May 09 Speaker, Workshop in “Deterministic and stochastic spatial modeling in population biology”, Palo Alto, USA. Talk: Theoretical framework to model interacting populations.

- Mar 09 Invited speaker, Probability Seminar, University of California in San Diego, USA. Talk: Coexistence in spatially explicit metapopulations.
- Jun 08 Invited speaker, Second Congress Canada-France, Montreal, Canada. Talk: Survival and coexistence in spatially explicit metapopulations.
- Sept 07 Speaker, Mathematical Biology seminar at Arizona State University, USA. Talk: Survival (and coexistence) in spatially explicit metapopulations.
- Mar 07 Invited speaker, Workshop on the Mathematics of Global Public Health, Arizona State University, USA. Talk: Individual versus cluster recoveries on social networks.
- Nov 06 Speaker, Probability Seminar of the Vincent Hall, University of Minnesota, USA. Talk: Host-symbiont interactions in static and dynamic environments.
- Jun 06 Invited speaker, Probability Seminar of the University of Orléans, France. Talk: Stochastic spatial models of host-symbiont interactions: Static and dynamic environments.
- Jan 06 Speaker, Probability Seminar at Cornell University, USA. Talk: Stochastic spatial models of host-symbiont interactions: Static and dynamic environments.
- Sept 05 Speaker, Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Competition among specialists and generalists in a heterogeneous environment.
- Jul 05 Speaker, First Cornell Probability Summer School, Cornell University, USA. Talk: Individual versus cluster recoveries on a lattice of social clusters.
- Jun 05 Speaker, Workshop on Probability of the University of Rouen, France. Talk: Stochastic spatial models of host-pathogen and host-mutualist interactions.
- Apr 05 Speaker, Probability Seminar of the Vincent Hall, University of Minnesota, USA. Talk: Continuity result for multicolor particle systems.
- Mar 05 Invited speaker, Seminar of the Department of Mathematics at the University of Marseille, France. Talk: Stochastic spatial models of host-pathogen and host-mutualist interactions.
- Mar 05 Speaker, Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Continuity result for multicolor particle systems.
- Jun 04 Speaker, Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Interacting particle systems and spatial structures.
- Dec 03 Speaker, Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Phase transitions for the multitype contact process with frozen sites.
- Jul 03 Speaker, Probability Summer School of the University of Prague, Czech Republic. Talk: Phase transitions for an ecological succession model.
- Jun 03 Speaker, Workshop on Probability of the University of Rouen, France. Talk: Phase transitions for an ecological succession model.
- May 03 Speaker, Seminar of the Department of Mathematics at the University of Rouen, France. Talk: Phase transitions for an ecological succession model.