

# Curriculum Vitae

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## Employments

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- 2007 - — Assistant professor in Mathematics, Department of Mathematics and Statistics, 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

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- 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*, University of Rouen, France.
- 2000 - 2001 Agrégation in Mathematics.
- 1999 - 2000 Maîtrise in Mathematics (1st year of Master's Degree), *Mention très bien*, University of Rouen, France.
- 1998 - 1999 Licence in Mathematics (Bachelor's Degree), *Mention très bien*, University of Rouen, France.

Note: In France, the Agrégation in Mathematics denotes a nationwide competition selecting people on their ability to teach, corresponding to a 1st year of Master's Degree in 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 theory and probability theory.

## Research interests

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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 nonspatial models. The aim of my research is to understand the role of space in ecology, epidemiology, population genetics, and opinion dynamics 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 and on inhomogeneous graphs.

## Publications and Preprints

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### Peer-Reviewed Publications

- [1] B. Chan, R. Durrett and N. Lanchier. Coexistence for a multitype contact process with seasons. *Ann. Appl. Probab.*, 19:1921–1943, 2009.
- [2] N. Lanchier and C. Neuhauser. Spatially explicit non-Mendelian diploid model. *Ann. Appl. Probab.*, 19:1880–1920, 2009.
- [3] L. Belhadji and N. Lanchier. Two-scale contact process and effects of habitat fragmentation on meta-populations. *Markov Process. Related Fields*, 14:487–514, 2008.
- [4] R. Durrett and N. Lanchier. Coexistence in host-pathogen systems. *Stochastic Process. Appl.*, 118:1004–1021, 2008.
- [5] N. Lanchier and C. Neuhauser. Voter model and biased voter model in heterogeneous environments. *J. Appl. Probab.*, 44:770–787, 2007.
- [6] 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.
- [7] N. Lanchier and C. Neuhauser. Stochastic spatial models of host-pathogen and host-mutualist interactions I. *Ann. Appl. Probab.*, 16(1):448–474, 2006.
- [8] L. Belhadji and N. Lanchier. Individual versus cluster recoveries within a spatially structured population. *Ann. Appl. Probab.*, 16(1):403–422, 2006.
- [9] N. Lanchier. A multitype contact process with frozen sites: a spatial model of allelopathy. *J. Appl. Probab.*, 42(4):1109–1119, 2005.
- [10] N. Lanchier. Phase transitions and duality properties of a successional model. *Adv. in Appl. Probab.*, 37(1):265–278, 2005.

### Recent Submissions

- [1] N. Lanchier. Two-scale multitype contact process.
- [2] N. Lanchier and C. Neuhauser. Ergodic theorems for a sexual reproduction contact process including genotypes.
- [3] N. Lanchier. Multitype voter model with confidence threshold.
- [4] N. Lanchier and C. Neuhauser. Stochastic spatial models of host-pathogen and host-mutualist interactions II.
- [5] D. Bertacchi, N. Lanchier and F. Zucca. Host-symbiont interactions in a random static-host environment.

### Works in Progress

- [1] Y. Kang and N. Lanchier. Deterministic and stochastic models with migration and bistability.
- [2] N. Lanchier and J. Neuffer. Geometric properties of the spatial majority rule model.

### Grant proposals

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- Stochastic processes on hypergraphs and dynamic graphs, NSF PD 04-1263, sole PI (pending).
- 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

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### University of Rouen, France

Instructor for graduate courses

- Measure and Integration Theory, Agrégation in Mathematics, Spring 02.
- Topology and Functional Analysis, Agrégation in Mathematics, Spring 03.
- Galois Theory, Agrégation in Mathematics, Fall 03.

Instructor for undergraduate courses

- Complex Analysis, 2nd year of Bachelor's Degree, Spring 03.
- Linear Algebra, 1st year of Bachelor's Degree, Spring 03, 05.
- Differential Calculus, 3rd year of Bachelor's Degree, Fall 03.
- General Analysis, 1st year of Bachelor's Degree, Fall 03.

### Arizona State University, USA

Instructor for graduate courses

- MAT 598 – Stochastic Modeling in Biology, Fall 07, Spring 08, 09.
- APM 541 – Stochastic Modeling in Biology, Fall 09.

Instructor for undergraduate courses

- STP 421 – Probability Theory, Fall 07, 08, 09.
- MAT 494 – From measure theory to stochastic processes (reading course), Spring 08.

## Seminars and conferences

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- Nov 09 Invited speaker, XI Congreso Latinoamericano de Probabilidad y Estadística Matemática, Caracas, Venezuela. Talk: Coexistence in spatially explicit metapopulations.
- Mar 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.
- Sep 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.

- Sep 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.

## Other professional activities

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### Reviewing and refereeing

- Reviewer for *Mathematical Reviews* (15 reviews)
- Referee for the journals *Probability Theory and Related Fields*, *Annals of Applied Probability*, *Stochastic Processes and Their Applications*, *Electronic Journal of Probability*, *Journal of Theoretical Biology*, *Mathematical Biosciences and Engineering*.

### Departmental committees

- Awards Committee (member), 2007-2008
- Probability Hiring Committee (member), 2008-2009, 2009-2010.
- STP 421 Qualifying Exam Committee (member), Fall 07, Spring 08, Fall 08.

### Mentoring

- Comprehensive Exam Committee, David Tello, Spring 2007.
- Doctoral Dissertation Committee Member (external reviewer), Joseph Stover, Spring 2008.
- Masters Thesis Committee Member, Kamal Barley, Spring 2008.
- Masters Thesis Committee Member, Christopher Person, Spring 2009.
- Advisor of a summer research project, William Feliciano, Summer 2009.
- Advisor of a summer research project, Ashley Robison, Summer 2009.
- Advisor of a Honor Thesis, Jared Neuffer, 2009–2010.
- Doctoral Dissertation Committee Member, Kevin Flores, Fall 2009.
- Doctoral Dissertation Committee Member, Michael Manley, Spring 2010.