

Nancy Rodríguez

CONTACT INFORMATION	Department of Applied Mathematics University of Colorado Boulder 11 Engineering Dr Boulder, CO 80309	Phone: (303) 492-5199 Fax: (303) 492-4066 E-mail: rodrign@coloado.edu
EDUCATION	University of California, Los Angeles , Los Angeles, CA. Ph.D., Mathematics • Thesis topic: <i>Applied PDEs in crime modeling and biological aggregation</i> • Advisor: Professor Andrea Bertozzi M.S., Mathematics	June 2011 June 2008
	University of San Diego , San Diego, CA. B.S., Mathematics with an applied emphasis • <i>Summa Cum Laude, Phi Beta Kappa</i> B.S./B.A Industrial and Systems Engineering • <i>Summa Cum Laude</i>	June 2006 June 2006
ACADEMIC EMPLOYMENT	University of Colorado at Boulder , Boulder, CO. Assistant Professor of Mathematics	August 2017 - present
	University of North Carolina at Chapel Hill , Chapel Hill, NC. Assistant Professor of Mathematics	July 2014 - July 2017
	Stanford University , Stanford, CA. NSF Postdoctoral Fellow Co-director of Summer Undergraduate Research in Mathematics	June 2011 – June 2014 January 2012 – March 2014
RESEARCH INTERESTS	Non-linear PDEs, mathematical modeling, biological aggregation, mathematical biology and ecology, crime modeling, chemotaxis, population dynamics.	
PUBLICATIONS	<ol style="list-style-type: none">Rodríguez, N. and Hu, Hh. On the Steady-states of a two-species non-local cross-diffusion model, under review at Journal of Applied Analysis (2019).Yang, C. and Rodríguez, N. <i>Existence and Stability Traveling Wave Solutions for a System of Social Outbursts</i>, under review at Journal of Nonlinear Science (2018).Yang, C. and Rodríguez, N. <i>A Numerical Perspective on Traveling Wave Solutions in a System for Rioting Activity</i>, submitted to Applied Mathematics and Computation (2018).Hassan, A. and Rodríguez, N. <i>Transport and concentration of wealth: modeling an amenities-based theory</i>, submitted to Mathematical Social Sciences (2019).Malanson, G. and Rodríguez, N., <i>Traveling waves and spatial patterns from dispersal on homogeneous and gradient habitats</i>, Ecological Complexity, Vol. 33, pg. 57-65 (2018).	

6. Rodríguez, N. and Malanson, G., *Plant dynamics, birth-jump processes and sharp traveling waves*, Bulletin of Math Biology, Vol. 80, pg. 1655–1687 (2018).
7. Rodríguez, N. and Winkler, M., *On the global existence and qualitative behavior of one-dimensional solutions to a model for urban crime*, under review at JMPA, 37 pages (2017).
8. Bonnasse-Gahot, L., Berestycki, H., Depuiset, M-A., Gordon, M. B., Roché, S., Rodríguez, N., Nadal, J-P., *Epidemiological modelling of the 2005 French riots: a spreading wave and the role of contagion*, Scientific Reports, online publication 10.1038/s41598-017-18093-4 (2018).
9. H. Berestycki, N. Rodríguez, and L. Rossi, *Periodic cycles of social outburst*, Journal of Differential Equations, Vol. 264, pg. 163-196 (2018).
10. H. Berestycki and N. Rodríguez, *Non-local reaction-diffusion equations with a gap*, Discrete and Continuous Dynamical Systems-A, Vol. 27, Issue 2, pg. 685-723 (2017).
11. H. Berestycki and N. Rodríguez, *Analysis of a heterogeneous model for riot dynamics: the effect of censorship of information*, European Journal of Applied Mathematics, Vol. 27, Special Issue 03, pg. 554-582, (2016).
12. N. Rodríguez and L. Ryzhik, *The effect of social preference, mobility, and the environment on segregation*, Communications in Mathematical Sciences, Vol. 14, No. 2, pg. 363-387, (2016).
13. H. Berestycki, J-P. Nadal and N. Rodríguez, *A model of riots dynamics: shocks, diffusion and thresholds*, Networks and Heterogeneous Media, Vol. 10, No. 3, pg. 443-475, (2015).
14. N. Rodríguez, *Recent advances in mathematical criminology, comment on “Statistical physics of crime: A review, by M.R. D’Orsogna and M. Perc”*, Physics of Life Review, Vol. 12, pg. 38-39, (2015).
15. N. Rodríguez, *On an Integro-differential model for pest control in a heterogeneous environment*, Journal of Mathematical Biology, Vol 70, No. 5, pg. 1177–1206 (2015).
16. J. Bedrossian and N. Rodríguez, *Inhomogeneous Patlak-Keller-Segel models and aggregation equations with nonlinear diffusion in \mathbb{R}^d* , Discrete and Continuous Dynamical Systems-B, Vol. 19, No. 24, pg. 1279–1309 (2014).
17. H. Berestycki, N. Rodríguez and L. Ryzhik, *Traveling wave solutions in a reaction-diffusion model for criminal activity*, Multiscale Modeling and Simulations, Vol. 11, Issue 4, pg. 1097-1126, (2013).
18. N. Rodríguez, *On the global well-posedness theory for a class of PDE models for criminal activity*, Physica D: Nonlinear Phenomena, pg. 191-200, (2013).
19. J. Bedrossian, N. Rodríguez and A. Bertozzi, *Local and global well-posedness for aggregation equations and Patlak-Keller-Segel models with degenerate diffusion*, Nonlinearity, Vol. 24, No. 6, pg. 1683-1714, (2011).
20. N. Rodríguez and A. Bertozzi, *Local existence and uniqueness of solutions to a PDE model for criminal behavior*, M3AS, special issue on Mathematics and Complexity in Human and Life Sciences, Vol 20, Issue supp01, pg. 1425–1457, (2010).

21. A.P. Velo, G.A. Gazonas, E. Bruder and N. Rodríguez, *Recursive dispersion relations in one-dimensional periodic elastic media*, *SIAM Journal on Applied Mathematics*, Vol. 69, No. 3, pg. 670–689, (2007).

GRADUATE
STUDENT
ADVISING

PhD students: Caroline Yang (UNC Chapel Hill: graduated 2018), Erin Ellefson, Lyndsey Wang.

Dissertation Committees: Claudia Falcon (UNC Chapel Hill), Zeliha Kilic (UNC Chapel Hill), Joshua Aurand, Jacqueline Wentz, Harry Dudley

PLENARY TALKS

- *Partial Differential Equations as Models for Social Complex Systems*, SIAM Non-linear Waves and Coherent Structures, Anaheim, CA. June 2018

SELECTED INVITED
TALKS

1. *Plant dynamics: a birth-jump approach*, CMS Winter Meeting, Vancouver, BC. December 2018
2. *Partial Differential Equations as Models for Social Complex Systems*, Oberwolfach Workshop: Differential Equations arising from Organising Principles in Biology, Oberwolfach, Germany October 2018
3. *Plant dynamics: a birth-jump approach*, Miami ICM Satellite Conference, Miami, FL. July 2018
4. *Position-Jump and Birth-Jump Processes*, AIM Workshop on Nonlocal Differential Equations in Collective Behavior, San Jose, CA. June 2018
5. *A model for riot dynamics: shocks, diffusion and thresholds*, Tianfu conference in PDEs, Chengdu, China. June 15, 2017
6. *Heterogeneous models with non-local diffusion*, AIMS sectional meeting, Charleston, SC. March 10-12, 2016
7. *On reaction-advection-diffusion models for multi-species segregation*, CMO-BIRS, Oaxaca, Mexico. June 2016
8. *On reaction-advection-diffusion models for multi-species segregation*, 46th Annual John H. Barrett Memorial Lectures, Knoxville, TN. May 2016
9. *Periodic outbursts of social activity*, KI-Net Conference on Collective Dynamics in Biological and Social Systems, Durham, NC. November 19-22, 2015
10. *On the steady-state solutions for a non-local system with cross-diffusion*, The Society for Mathematical Biology, Atlanta, GA. June, 2015
11. *On the global well-posedness of a two species interaction model with cross-diffusion*, Workshop for Women in Analysis and PDE, Minneapolis, MN. May 29, 2015
12. *A model for riot dynamics: shocks, diffusions, and thresholds*, SIAM Dynamical Systems, Snowbird, UT. May 18, 2015
13. *A model for riot dynamics: shocks, diffusions, and thresholds*, Latinos in the Mathematical Sciences Conference, Los Angeles, CA. April 9, 2015
14. *A model for riot dynamics: shocks, diffusions, and thresholds*, AMS Sectional Meeting, Washington D.C. March 7, 2015

15. *A stochastic model of riots: diffusion and thresholds*, Modeling and Control in Social Dynamics, Camden, NJ. October 6, 2014
16. *The effect of social preference, mobility, and the environment on segregation*, Modeling and Control in Social Dynamics, Baltimore, MD. October 15, 2013
17. *On a nonlocal reaction diffusion equation: applications in ecology, neural networks, and urban crime*, SACNAS 2013, San Antonio, TX. October 5, 2013
18. *Non-local effects in social phenomena*, BIRS: PDEs in the social and life science, Banff, Canada. April 2, 2013
19. *Hotspots and diffusion of criminal activity*, CAMS-EHESS, Paris, France. February 13, 2013
20. *Invasion of hotspots; traveling wave solutions to a reaction-diffusion equation*, 7th Biannual Blackwell-Tapia Conference, ICERM, RI. November 10, 2012
21. *Commuter criminals and integro-differential equations*, PIMS Hot Topics Workshop on Computational Criminology, Vancouver, BC, Canada. Sep. 20, 2012
22. *Invasion of hotspots; traveling wave solutions to a reaction-diffusion equation*, BIRS, Banff, CA. July 23-27, 2012
23. *Global theory for an aggregation equation with degenerate diffusion*, International Congress on Industrial and Applied Mathematics, Vancouver, BC, Canada. July 18-22, 2011
24. *Existence and blow-up of an aggregation equation with degenerate diffusion*, The Joint Mathematics Meeting, New Orleans, LA. January 5-9, 2011
25. *Local existence and blow-up of an aggregation equation with degenerate diffusion*, IPAM Optimal Transport Reunion, Lake Arrowhead, CA. December 12-17, 2010
26. *Reaction-diffusion models of crime in heterogeneous urban environments*, The American Society of Criminology Annual Meeting 2010, San Francisco, CA. November 19, 2010
27. *A PDE model for criminal behavior: existence theory*, Infinite Possibilities Conference, Los Angeles, CA. March 2010
28. *Local existence/uniqueness of solutions to a PDE model for criminal behavior*, Workshop on Analysis and Modeling of Crime, Santiago, Chile. Jan. 4-7, 2010

INVITED SEMINAR
TALKS

Colorado School of Mines	January 2018
University of Miami	April 2017
University of Alberta	October 2016
Brown University	February 2016
University of Delaware	November 2015
Pontifical Catholic University of Rio de Janeiro	May 2015
North Carolina State University	December 2014
Duke University	October 2014
Purdue University Seminar	July 2013
Rice University Colloquium	April 2013

University of California at Berkeley PDE Seminar	November 2012
Santa Clara University Colloquium	May 2012
University of California at Santa Cruz Colloquium	January 2012
University of California at Riverside	April 2011
University of San Diego Seminar	February 2011
Universidad de Santiago de Chile PDE Seminar	January 2010

SELECTED
SERVICE TALKS

<i>What Calculus can tell us about life.</i> UNC Office of Undergraduate Research, Methods of Inquiry, Chapel Hill, NC.	February 2017
<i>What Calculus can tell us about life.</i> Graduate Research Opportunities for Women, Northwestern, Evanston,	October 2016
<i>Calculus in social, biological, and ecological phenomena.</i> Girls Talk Math, Chapel Hill, NC.	June 2016
<i>Calculus in social, biological, and ecological phenomena.</i> Girls Advancing STEM Conference, Durham, NC.	April 4, 2016
<i>Modeling aggregation.</i> A talk tailored for students in the MSRI-UP program, Berkeley, CA.	July 27, 2014
<i>American Pi: Changing the Stereotypes in Mathematics.</i> Keynote for ADVANCE PRiME, Lafayette, IN.	July 19, 2013
<i>Criminal activity, ecology and nerve pulse propagation: my life in mathematics.</i> A talk tailored towards women and minorities in STEM, Houston, TX.	April, 2013
<i>Modeling Urban Crime.</i> A talk tailored towards undergraduates, Palo Alto, CA.	October 25, 2012

AWARDS AND
FELLOWSHIPS

Stanford University	
• NSF Mathematical Sciences Postdoctoral Fellowship	June 2011-June 2014
• AWM-NSF Mentoring Travel Grant	April 2013
• USD McNair Doctoral Achievement Award	May 2012
University of California, Los Angeles	
• UCLA Graduate Division Fellowship	2010–2011
• NSF VIGRE Fellowship	2009–2010
• Ford Foundation Fellowship	2006–2009
University of San Diego	
• Outstanding Academic Achievement in Mathematics	May 2006
• Outstanding Service Award in Mathematics	May 2006
• ISE Outstanding Senior of the Year	2006
• McNair Scholar	2004–2006
• Goldwater Fellow	2003–2006

TEACHING
EXPERIENCE

CU Boulder, Boulder, CO.

Instructor

- *APPM 5450 - Applied Analysis 2*
(graduate class, 15 students) Spring 2019
- *APPM 2360 - Intro to Differential Equations and Linear Algebra*
(100 students) Spring 2019
- *APPM 5440 - Applied Analysis 1*
(graduate class, 17 students) Fall 2018

UNC Chapel Hill, Chapel Hill, NC.

Instructor

- *Math 751 - Partial Differential Equations*
(graduate class, 5 students) Spring 2018
- *Math 529 - Partial Differential Equations and Complex Analysis*
(50 students) Spring 2018
- *Math 769 - Reaction-advection-diffusion equations and applications*
(graduate class, 7 students) Spring 2017
- *Math 383 H - A first course in Differential Equations (honors)*
(19 students) Spring 2017
- *Math 383 - A first course in Differential Equations* (52 students) Fall 2016
- *Math 769 - Reaction-advection-diffusion equations and applications*
(graduate class, 6 students) Spring 2016
- *Math 383 H - A first course in Differential Equations (honors)*
(17 students) Spring 2015
- *Math 383 - A first course in Differential Equations* (31 students) Fall 2014

Stanford University, Stanford, CA.

Instructor

- *Linear Algebra and Multivariable Calculus*
(2 courses, 50 students/course) Fall 2012
- *Accelerated Calculus*
(2 courses, 50 students/course) Fall 2011

Prison University Project, San Quentin Prison, CA.

- *Developmental math instructor* Fall 2013

UCLA Math Boot Camp 2010, Los Angeles, CA.

- *Workshop Instructor* Summer 2010

Academic Excellence Workshop, Los Angeles, CA.

- *Workshop Instructor* Fall 2008

GRANTS
AWARDED

- NSF Applied Mathematics: \$301,796.
Title: Nonlinear and Non-local Models in Social and Ecological Systems.
Role: PI 2019-2021.
- UNC Junior Faculty Development Award: \$ 7,500.
- UNC FIRE Grant: \$25,000.
Title: Data-driven Modeling of Gentrification.
- NSF Applied Mathematics: \$169,999.
Title: Models for Social, Ecological, and Biological Systems: Narrowing the Gap Between Theory and Applications.
Role: PI 2014-2018
- AWM-NSF Mentoring Travel Grant: for amount of \$4600.
Title: Fractional Diffusion and Reaction Systems: Globalization Effects on Criminal Activity. *Role:* Co-PI 2014

- NSF Mathematical Sciences Postdoctoral Research Fellowship: \$135,000.
Title: Nonlinear PDE models for Urban Crime. *Role:* PI 2011-2014
- SERVICE
- Graduate Committee August 2018 - present
 - Applied Analysis Prelim January, 2019
 - UNC Science Fair April 2017
 - Undergraduate Committee August 2016 - present
 - Undergraduate Research Summer 2016
Directed four undergraduate research projects: Ali Hasan, Sean Catangui, Alexandra Cowand, Shengding Sun, Avishai Halev
 - NSF-DMS Panel Spring 2016
 - Recruited UNC's Chancellor's of Science Scholars and Morehead Scholars 2014-2017
 - Qualifying Ph.D. Exams Committee Reader Fall 2014-Present
 - Interviewing Member for UNC's Chancellor's of Science Scholars Spring 2015
 - Modern Math Workshop, SACNAS 2014, Los Angeles, CA.
Mini-course instructor October 2014
 - Latinos in Mathematics Conference, IPAM, Los Angeles, CA.
Member of Organizing Committee November 2013 - April 2014
 - Beatrice Yormark Distinguished Visitor Lecture, Stanford, CA.
Co-organizer Fall 2011–Fall 2014
 - ¿Así Que Quieres Ser un Matemático?
A Panel Discussion with Latino/a Mathematicians, Los Angeles, CA.
Panel Member April 22, 2013
 - Pacific Coast Undergraduate Math Conference, Los Angeles, CA.
Graduate Panel March 2010
 - Infinite Possibilities Conference 2010, Los Angeles, CA.
Invited Panelist March 2010
 - UCLA Latinas Guiding Latinas, Los Angeles, CA.
Volunteer September 2006 – June 2008
 - **Served as a referee for the following journals:** Nonlinearity; SIAM Journal on Mathematical Analysis; Nonlinear Analysis Series A: Theory, Methods and Applications; Discrete and Continuous Dynamical Systems; European Journal of Applied Mathematics; Communications in Math Sciences; International Journal of Bifurcation and Chaos; Journal of Mathematical Biology; Journal of Differential Equations; Communications on Pure and Applied Analysis; Physica D: Nonlinear Phenomena, PLOS ONE.