

Pablo Martin RODRIGUEZ | Curriculum Vitae

Adjunct Professor CCEN/UFPE | Council Member of SBMAC

Institution: Department of Statistics, Federal University of Pernambuco
Research Interests: probability theory, interacting particle systems, stochastic processes, stochastic modelling of complex systems, random structures, stochastic rumors, evolution algebras.

Recife - PE, Brazil
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Summary

Adjunct Professor of the Department of Statistics at the Centre of Natural and Exact Sciences of the Federal University of Pernambuco (CCEN/UFPE), located in the city of Recife, PE, Brazil. Council member and former President of the Brazilian Society of Computational and Applied Mathematics - SBMAC. His current research activity can be divided into three broad lines. The main part is focused on using interacting particle systems, percolation models and special stochastic processes on graphs to describe the spread of an information and other similar phenomena on a population. Also, he is interested in studying (asymptotical) properties of random structures inspired by biological questions, and related subjects of discrete mathematics. This includes some percolation and random graph models. Finally, and more recently, he started to get involved in studying new algebraic structures called evolution algebras. His interest in the subject is, among other things, because of a nice interplay between the concept of evolution algebras and some notions related to discrete-time Markov chains.

Research Background and Positions Held

Council - Brazilian Society of Computational and Applied Mathematics (SBMAC) <i>Full Council Member of SBMAC.</i>	2024 - present
Board of Trustees - Development Support Foundation of the UFPE (Fade-UFPE) <i>Full Member of FADE Board of Trustees.</i>	2020 - present
Adjunct Professor - CCEN, Federal University of Pernambuco (UFPE) <i>Head of the Research Group Stochastic Processes and Random Structures. Coordinator of the Graduate Program in Statistics (2022-present). Deputy Coordinator of the Graduate Program in Statistics (2020-2022).</i>	2019 - present
President - Brazilian Society of Computational and Applied Mathematics (SBMAC) <i>Chair of the Director's Board.</i>	2020 - 2023
Habilitation - ICMC, University of São Paulo (USP) <i>Monograph: Topics in Probability and Discrete Mathematics.</i>	2019
Director's Board - Brazilian Society of Computational and Applied Mathematics (SBMAC) <i>Coordinator of the XXXIX Congresso Nacional de Matemática Aplicada e Computacional. Co-creator and coordinator of the Comitê Latino Americano de Matemática Aplicada, Computacional e Industrial.</i>	2018 - 2019
Researcher - National Council for Scientific and Technological Development (CNPq) <i>Research fellowship level: 2. Field: Mathematics and Statistics.</i>	2017 - 2020
Adjunct Professor - ICMC, University of São Paulo (USP) <i>Deputy Coordinator of the Joint Graduate Program in Statistics UFSCar/USP (2017-2019). Co-creator of the Workshop on Probabilistic and Statistical Methods held annually by USP & UFSCar.</i>	2012 - 2019

Education and Postdoctoral Positions

FAPESP Postdoctoral Fellow - LPMA, Paris Diderot University (Paris 7)	2015 - 2016
<i>Project: Asymptotic behavior of stochastic processes on graphs and applications.</i>	
FAPESP Postdoctoral Fellow - IMECC, University of Campinas (UNICAMP)	2010 - 2011
<i>Project: Systems of random walks and their applications to information diffusion models.</i>	
Ph.D. Degree in Statistics - IME, University of São Paulo (USP)	2007 - 2010
<i>Thesis: Limit theorems for general stochastic rumor models. Advisor: Fábio Prates Machado. Co-advisor: Élcio Lebensztayn</i>	
Master Degree in Statistics - IME, University of São Paulo (USP)	2005 - 2007
<i>Dissertation: Phase transition for a disk percolation model on graphs. Advisor: Élcio Lebensztayn</i>	
Bachelor Degree in Mathematics - National University of Patagonia (UNPSJB)	2000 - 2004

Award and Main Grants

FACEPE Research Grant - APQ-1341-1.02/22	2022 - present
<i>Project: Characterization of special stochastic processes and discrete (random) structures (coordinator)</i>	
CAPES Math-AMSUD Research Grant - 88881.197412/20	2019 - 2021
<i>Project: Rare events analysis in multi-component systems with dependent components (coordinator - Brazilian side)</i>	
FAPESP Research Grant - 2016/11648-0	2016 - 2018
<i>Project: Limit theorems and phase transition results for information propagation models (coordinator)</i>	
FAPESP Research Grant - 2013/03898-8	2013 - 2015
<i>Project: Stochastic modeling of information diffusion on interacting systems (coordinator)</i>	
CNPq Universal Research Grant - 479313/2012-1	2012 - 2015
<i>Project: Stochastic models of information diffusion (coordinator)</i>	
Manuel Balanzat Prize - Argentine Mathematical Union	2003
<i>First Place in Competition of Undergraduate Monographs</i>	

Main Refereeing Service

- Editor of the following journals:
 - Mathematical and Computational Applications (ISSN 2297-8747). Editorial Board Member (2022-present).
 - PLOS ONE (ISSN: 1932-6203). Academic Editor (2021-present).
 - Pesquisa Operacional para o Desenvolvimento (ISSN: 1984-3534, journal of the Brazilian Operations Research Society). Associate Editor (2021-present).

- Referee for the following Journals:

- Brazilian Journal of Physics,
- Brazilian Journal of Probability and Statistics,
- Computational & Applied Mathematics,
- Discrete and Continuous Dynamical Systems Series B,
- Electronic Communications in Probability,
- European Journal of Control,
- Europhysics Letters,
- IEEE Access,
- INFORMS Journal on Computing,
- Journal of Algebraic Combinatorics,
- Journal of Complex Networks,
- Journal of Mathematical Biology,
- Journal of Statistical Mechanics,
- Journal of Statistical Physics,
- Markov Processes and Related Fields,
- Mathematical and Computational Applications,
- Mathematical Methods in the Applied Sciences,
- Mathematics,
- Physica A: Statistical Mechanics and its Applications,
- Physica Scripta,
- PLoS One,
- Proceedings 52nd IEEE Conf. on Decision and Control,
- São Paulo Journal of Mathematical Sciences,
- Scientific Reports,
- Statistics & Probability Letters,
- Tendências em Matemática Aplicada e Computacional.

- Referee for the following Agencies:

- Amazonas Research Foundation - FAPEAM (Brazil),
- Italian National Agency for the Evaluation of the University and Research Systems - ANVUR (Italy),
- National Council for Scientific and Technological Development - CNPq (Brazil),
- São Paulo Research Foundation - FAPESP (Brazil).

Publications

1. Multistability, intermittency and hybrid transitions in social contagion models on hypergraphs (with G. Ferraz de Arruda, G. Petri and Y. Moreno). *Nature Communications* 14 (2023): 1375.
2. On the role of reduced habitat in the phase transition of a stochastic model for seed dispersal (with C. Coletti and N. Maric). *Mathematical Methods in the Applied Sciences* 46 (2023): 10540-10553.
3. Hilbert evolution algebras and its connection with discrete-time Markov chains (with Vidal and Cadavid). *Indian Journal of Pure and Applied Mathematics* 54 (2023): 883-894.
4. The Bell-Touchard counting process (with T. Freud). *Applied Mathematics and Computation* 444 (2023): 127741.
5. On Hilbert evolution algebras of a graph (with Vidal and Cadavid). *Siberian Mathematical Journal* 63 (2022): 995-1011.
6. Stochastic rumors on random trees (with V. V. Junior and A. Speroto). *Journal of Statistical Mechanics: Theory and Experiment* 2021 (2021): 123403.
7. On the fractional queueing model with catastrophes (with M. O. Souza). *Applied Mathematics and Computation* 410 (2021): 126468.
8. The role of multiple repetitions on the size of a rumor (with A. Rada, C. F. Coletti and E. Lebensztayn). *SIAM Journal on Applied Dynamical Systems* 20 (2021): 1209-1231.
9. On the characterization of the space of derivations in evolution algebras (with Cabrera, Cadavid and Rodiño). *Annali di Matematica Pura ed Applicata* 200 (2021): 737-755.

10. On the isomorphisms between evolution algebras of random walks and graphs (with P. Cadavid and M. L. Rodiño). *Linear & Multilinear Algebra* 69 (2021): 1858-1877.
11. The Maki-Thompson rumor model on infinite Cayley trees (with V. V. Junior and A. Speroto). *Journal of Statistical Physics* 181 (2020): 1204-1217.
12. A note on a stage-specific predator-prey stochastic model (with C. Pimentel and A. Valencia). *Physica A: Statistical Mechanics and its Applications* 553 n.1 (2020): 124575.
13. An improved lower bound for the critical parameter of the Stavskaya's process (with A. Ramos, C. Sousa and P. Cadavid). *Bulletin of the Australian Mathematical Society* 102 (2020): 517-524.
14. Galton-Watson processes in varying environment and accessibility percolation (with D. Bertacchi and F. Zucca). *Brazilian Journal of Probability and Statistics* 34 n.3 (2020): 613-628.
15. Limit theorems for a stochastic model of adoption and abandonment innovation on homogeneously mixing populations (with K. Oliveira). *Journal of Statistical Mechanics: Theory and Experiment* 2020 n.3 (2020): 033404.
16. The connection between evolution algebras, random walks, and graphs (with P. Cadavid and M. L. Rodiño). *Journal of Algebra and Its Applications* 19 (2020): 2050023.
17. Characterization theorems for the space of derivations of evolution algebras associated to graphs (with P. Cadavid and M. L. Rodiño). *Linear & Multilinear Algebra* 68 n.7 (2020): 1340-1354.
18. Asymptotic behavior for a modified Maki-Thompson model with directed inter-group interactions (with C. Grejo). *Journal of Mathematical Analysis and Applications* 480 (2019): 123402.
19. Frog models on trees through renewal theory (with S. Gallo). *Journal of Applied Probability* 55 n.3 (2018): 887-899.
20. Comment on "Nodal infection in Markovian susceptible-infected-susceptible and susceptible-infected-removed epidemics on networks are non-negatively correlated" (with A. Roldan and A. Valencia). *Physical Review E* 98 (2018): 026301.
21. A General Markov Chain Approach for Disease and Rumor Spreading in Complex Networks (with G. Arruda, E. Cozzo, Y. Moreno and F. Rodrigues). *Journal of Complex Networks* 6 n.2 (2018): 215-242.
22. Evolution of a modified binomial random graph by agglomeration (with M. Kang and A. Pachón). *Journal of Statistical Physics* 170 n.3 (2018): 509-535.
23. On the existence of accessibility in a tree-indexed percolation model (with C. Coletti and R. Gava). *Physica A: Statistical Mechanics and its Applications* 492 (2018): 382-388.
24. Phase transition for the MT rumor model on a small-world network (with Agliari, Pachón, and Tavani). *Journal of Statistical Physics* 169 n.4 (2017): 846-875.
25. A stochastic two-stage innovation diffusion model on a lattice (with C. Coletti and K. Oliveira). *Journal of Applied Probability* 53 n.4 (2016): 1019-1030.
26. A process of rumor scotching on finite populations (with G. Arruda, E. Lebensztayn and F. Rodrigues). *Royal Society Open Science* 2 (2015): 150240.
27. The role of centrality for the identification of influential spreaders in complex networks (with G. Arruda, A. Barbieri, F. Rodrigues, Y. Moreno and L. Costa). *Physical Review E* 90 (2014): 032812.

28. Rumor processes on \mathbb{N} and discrete renewal processes (with S. Gallo, N. Garcia and V. Vargas). *Journal of Statistical Physics* 155 n.3 (2014): 591-602.
29. A connection between a system of random walks and rumor transmission (with E. Lebensztayn). *Physica A: Statistical Mechanics and its Applications* 392 n.23 (2013): 5793-5800.
30. A spatial stochastic model for rumor transmission (with C. F. Coletti and R. B. Schinazi). *Journal of Statistical Physics* 147 n.2 (2012): 375-381.
31. Limit theorems for a general stochastic rumour model (with E. Lebensztayn and F. P. Machado). *SIAM Journal on Applied Mathematics* 71 n.4 (2011): 1476-1486.
32. On the behaviour of a rumour process with random stifling (with E. Lebensztayn and F. P. Machado). *Environmental Modelling and Software* 26 n.4 (2011): 517-522.
33. The disk-percolation model on graphs (with Lebensztayn). *Statistics and Probability Letters* 78 n.14 (2008): 2130-2136.

Preprints

1. Hilbert evolution algebras, weighted digraphs, and nilpotency (with P. Cadavid and S. Vidal). *Submitted*.
2. The impact of effective participation in stopping a misinformation: an approach based on branching processes (with V. Vargas and L. M. Gomez). *Submitted*.
3. On the mean absorption time of multiple coalescing particles with removal at previously visited vertices (with M. Estrada and A. Ramos). *Submitted*.

Students & Postdocs

I have supervised or currently supervising projects in the following Graduate Programs:

- Graduate Program in Applied Statistics, UDENAR, Colombia (EA/UDENAR).
- Graduate Program in Statistics, UFPE (PPGE/UFPE).
- Joint Graduate Program in Statistics UFSCar/USP (PIPGES/UFSCar-USP).
- Graduate Program in Computer Science and Computational Mathematics (CCMC/USP).
- Graduate Program in Engineering Sciences, UNPSJB, Argentina (DCI/UNPSJB).
- Professionalizing Master's Program in Mathematics ICMC-USP/SBM (PROFMAT/USP-SBM)

In addition, I have supervised or currently supervising undergraduate projects of students from different universities (USP, UFPE, Universidad Nacional de la Patagonia - ARG, Universidad de Nariño - COL, Universidad de Antioquia - COL).

Current Students & Postdoc

Ph.D. - 2 current students

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- *Jhon Puerres, Aug 2023 - present (FACEPE), PPGE/UFPE.*
 - *Nelson Villagra, Aug 2018 - present (co-advisor), DCI/UNPSJB, ARG.*

Master - 6 current students

- Raquel Rolim, Mar 2023 - present, PPGE/UFPE.
- José Manuel Jaramillo Toro, Mar 2023 - present (FACEPE), PPGE/UFPE.
- Maria Mariana Alves de França, Jan 2023 - present (CAPES), PPGE/UFPE.
- Christian Pistala, Jul 2022 - present, EA/UDENAR.
- Ana Diaz Bacca, Mar 2022 - present (FACEPE), PPGE/UFPE.
- Débora Cordeiro, Mai 2021 - present (FACEPE), PPGE/UFPE.

Former Students & Researchers Supervised

Postdoctoral - 2 researchers

- Mario Estrada, Apr 2020 - Aug 2021 (CAPES/FACEPE), PPGE/UFPE.
- Carolina Bueno Grejo, Oct 2017 - Fev 2019 (CAPES), PIPGES/UFSCar-USP.

Ph.D. - 4 former students

- Jean Carlos Cardoso, Nov 2023 (FACEPE), PPGE/UFPE.
- Adalto Speroto, Apr 2021 (CAPES), PIPGES/UFSCar-USP.
- Carlos Hirth, Jan 2020 (CAPES), PIPGES/UFSCar-USP.
- Karina Emboaba de Oliveira, Apr 2019 (CAPES and FAPESP), PIPGES/UFSCar-USP.

Master - 11 former students

- Jhon Puerres, Jul 2023 (CAPES), PPGE/UFPE.
- João Antônio Miranda Gondim, Jul 2023, PPGE/UFPE.
- Luciano Soares Mendes Júnior, Aug 2022 (FACEPE), PPGE/UFPE.
- Diego da Silva Santos, Feb 2022 (CAPES), PPGE/UFPE.
- Thomás Freud de Moraes Gonçalves, Feb 2022 (CAPES), PPGE/UFPE.
- Ricardo Caldas, Fev 2020, PIPGES/UFSCar-USP.
- Dimas Rocha, Fev 2018 (CAPES), PROFMAT/USP-SBM.
- Elizabeth Chipa Bedia, Mar 2016 (CAPES, co-advisor), PIPGES/UFSCar-USP.
- Eduardo Sartoretto, Mar 2016 (CNPq), CMCC/USP.
- Cristel Ecaterin Vera Tapia, Mar 2015 (CAPES), PIPGES/UFSCar-USP.
- Karina Emboaba de Oliveira, Jan 2015 (FAPESP), CMCC/USP.

Undergraduate Monograph (TCC) - 5 former students

- Ana Diaz Bacca, Mathematics, Universidad de Nariño, Pasto, COL, Feb 2022 (co-advisor).
- Jose Jaramillo, Mathematics, Universidad de Antioquia, Medellín, COL, May 2022 (co-advisor).
- Matheus Oliveira de Souza, Statistics ICMC-USP, Jul 2019 (CNPq), USP.
- Caio Moura Quina, Statistics ICMC-USP, Nov 2017 (FAPESP), USP.
- Emanuel Rodriguez, Informatics, Univ. Nacional de la Patagonia, Comodoro Rivadavia, ARG, Sep 2016 (co-advisor).

Selected Invited Lectures and Talks for Meetings (last 10 years)

Probabilistic models to illustrate the spread of information (Spanish) - Opening Plenary

Aug 2021

X Congreso Internacional de Matemática Aplicada y Computacional, SPMAC, Perú.

On branching processes and percolation models on trees (in Spanish) - Webinar

Jan 2021

IV Mini Escuela de Verano en Probabilidades, Chile. Link: <https://youtu.be/RciLBpU7AvY>

Probabilistic models to the propagation of information (in Spanish) - Webinar Oct 2020

IV Seminario Virtual de Estadística "Análisis y modelos estadísticos", UNAD, Colombia. Link: <https://youtu.be/OJSqtuFw95g>

Stochastic rumors (in Portuguese) - Conference Nov 2019

ERMAC, Univasf, Petrolina, PE, Brazil

Probabilistic Models (in Spanish) - Course Jun 2019

XV Congreso Dr. Antonio Monteiro, UNS, Bahía Blanca / EMALCA 2019, UNPSJB, Comodoro Rivadavia, Argentina

Probabilistic Models and their Applications (in Spanish) - Course Mai - Jun 2017

MACI 2017, UNPSJB, Comodoro Rivadavia, Argentina / EMALCA 2017, UdeA, Medellín, Colombia

On a modified binomial random graph by agglomeration (in Portuguese) - Conference Jul 2014

21 SINAPE, Natal, RJ, Brazil

In addition, I have given seminars at:

- Universidad Católica San Pablo (PER)
- Universidade Federal de Mato Grosso do Sul - UFMS
- Universidade Federal de Rio de Janeiro - UFRJ
- Universidad Nacional Abierta y a Distancia (COL)
- Universidade de Brasilia - UNB
- Universidade Estadual Paulista - UNESP, Botucatu
- Universidade Federal de Goiás - UFG
- Universidad del Valle (COL)
- Università di Milano-Bicocca (ITA)
- Università di Torino (ITA)
- Collège de France (FRA)
- Université Paris Diderot (FRA)
- Universidade Federal de Santa Catarina - UFSC
- FFCLRP / Universidade de São Paulo - USP
- ICMC / Universidade de São Paulo - USP
- Universidad Nacional de la Patagonia (ARG)
- IME / Universidade de São Paulo - USP
- Universidade Federal do ABC - UFABC
- IMECC / Universidade Estadual de Campinas - UNICAMP
- Universidade Federal de Pernambuco - UFPE
- Universidad de Buenos Aires (ARG)

Main conferences, sessions, and other scientific activities coordinated (last 10 years)

Latin American Congress on Industrial and Applied Mathematics (LACIAM) - Co-chair Jan 2023

EMAp-FGV, Rio de Janeiro, RJ

Mathematical and Comp. Modeling of Rare Events in Complex Systems - Chair Nov 2019

Workshop at UFPE related to our CAPES Math-AMSUD Research Project, Recife, PE

XXXIX Congresso Nacional de Mat. Aplicada e Comput. (CNMAC) - Chair Sep 2019

Annual Congress of SBMAC joining together around 800 participants. UFU, Uberlândia, MG

Evolution Algebras and non associative algebraic structures - Chair Jul 2019

Contributed Mini Symposium at ILAS 2019, FGV, Rio de Janeiro, RJ

Latin American School of Mathematics - Chair Aug/Sep 2018

CMCC-UFABC, Santo André, SP

Mathematical modeling of random structures and complex systems - Chair May 2017

Mini-symposium organized at the VI MACI. UNPSJB, Comodoro Rivadavia, Chubut, Argentina

Stochastic processes in random environment and applications - Chair

Aug 2016

Special Session organized in the First Joint Meeting Brazil - Italy in Mathematics. IMPA, Rio de Janeiro, RJ

4th Workshop in Stochastic Modeling - Chair

Nov 2014

Meeting organized by the members of the São Paulo Research Foundation thematic project/grant titled "Stochastic Modeling of Interacting Systems". ICMC-USP & UFSCar, São Carlos, SP

Probability and Complex Systems Seminar - Chair

Apr 2014 to Jul 2015

Sequence of seminars organized weekly by the Probability Research Group from the Joint Graduate Program in Statistics USP/UFSCar. ICMC-USP & UFSCar, São Carlos, SP

Probability and Stochastic Processes - Chair

Jul 2014

Thematic Session 21 SINAPE, Natal, RN

2nd Workshop on Probabilistic and Statistical Methods - Chair

Fev 2014

Meeting organized by the Joint Graduate Program in Statistics UFSCar/USP (PIPGEs). UFSCar, São Carlos, SP

Languages

- Spanish. Fluent (native language)
- Portuguese. Fluent (Speaking, reading, and writing)
- English. Intermediate (Speaking, reading, and writing)

RODRIGUEZ, Pablo Martin.

Recife, PE, Brazil. January 1st, 2024.