

# Carlos E. Rodríguez

Updated: August 2022

## Research Interests

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Bayesian statistics, simulation and applied statistics: Bayesian non- and semi-parametric methods, efficient random variate generation, MCMC algorithms and finite population sampling.

## Contact Information

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**Institute:** Applied Mathematics and Systems Research Institute (IIMAS by its Spanish acronym) at the National Autonomous University of Mexico (UNAM by its Spanish acronym)

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## Academic Positions

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**Associate Researcher** 2018 (August)– to date

Department of Probability and Statistics, IIMAS-UNAM

**Visiting Professor** 2016–2018 (August)

Department of Mathematics, Metropolitan Autonomous University (UAM)

**Postdoctoral Fellowship** 2013 (January–March)

Department of Genetics, Evolution and Environment

University College London (UCL), UK

**Research Assistant** 2006–2008

Department of Probability and Statistics, IIMAS-UNAM

## Education

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**PhD in Statistics** 2009–2013

University of Kent, UK

*Thesis:* Contributions to the Bayesian Analysis of Mixture Models

*Supervisor:* Stephen G. Walker

**MSc. in Mathematics and BSc. in Actuarial Sciences** 2006 / 2004

UNAM

## Non academic employment

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**External Adviser** 2016 - 2020

Scientific and Technological Advisory Forum

<b>Adviser for the Quick-Count</b> Mexican Institute for National Elections	2015, 2016, 2018, 2019, 2020, 2021 and 2022
<b>Adviser for the Quick-Count in the Election for Governor in State of Mexico</b> State of Mexico Institute for Elections	2017
<b>Strategic Project Manager</b> Scientific and Technological Advisory Forum	2014-2016
<b>Data Processing Manager</b> Berumen y Asociados (Marketing Consulting Services)	2013-2014

## Publications in peer reviewed journals

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- [1]: Yang, Z., and Rodríguez, C. E., (2013). Searching for efficient Markov chain Monte Carlo proposal kernels *Proceedings of the National Academy of Sciences of the United States of America*, 110 (48), Ed. National Academy of Sciences U.S.A., pp. 19307-19312, ISSN: 0027-8424, [doi:10.1073/pnas.1311790110](https://doi.org/10.1073/pnas.1311790110).
- [2]: Rodríguez, C. E., and Walker, S. G., (2014). Univariate Bayesian nonparametric mixture modeling with unimodal kernels, *Statistics and Computing*, 24 (1), Ed. Springer, pp. 35-49, ISSN: 0960-3174, [doi:10.1007/s11222-012-9351-7](https://doi.org/10.1007/s11222-012-9351-7).
- [3]: Rodríguez, C. E., and Walker, S. G., (2014). Label switching in Bayesian mixture models: deterministic relabeling strategies, *Journal of Computational and Graphical Statistics*, 23 (1), Ed. Taylor and Francis, pp. 25-45, ISSN: 1061-8600, [doi:10.1080/10618600.2012.735624](https://doi.org/10.1080/10618600.2012.735624).
- [4]: Rodríguez, C. E., Núñez-Antonio, G., and Escarela G. (2020). A Bayesian Mixture Model for Clustering Circular Data, *Computational Statistics & Data Analysis*, 143, Ed. Elsevier, ISSN: 0167-9473. [doi:10.1016/j.csda.2019.106842](https://doi.org/10.1016/j.csda.2019.106842).
- [5]: Escarela G., Rodríguez, C. E. and Núñez-Antonio G. (2020). Copula Modeling of ROC and Predictiveness Curves, *Statistics in Medicine*, 39 (28), Ed. Wiley, pp. 4252-4266. [doi.org/10.1002/sim.8723](https://doi.org/10.1002/sim.8723).
- [6]: Rodríguez, C. E. and Walker, S. G. (2021). Copula Particle Filters, *Computational Statistics & Data Analysis*, 161, Ed. Elsevier, ISSN: 0167-9473. [doi.org/10.1016/j.csda.2021.107230](https://doi.org/10.1016/j.csda.2021.107230).
- [7]: Rodríguez, C. E. and Mena, R. H. (2022). COVID-19 Clinical footprint to infer about mortality, to appear in *Journal of the Royal Statistical Society, Series A*.
- [8]: Rodríguez, C. E., Nieto-Barajas, L. E. and Pérez-Pérez, C. S. (2022). Dealing with missing data under stratified sampling designs where strata are study domains, to appear in *Journal of Applied Statistics*.
- [9]: Santana-Cibrian, Mario and Acuña-Zegarra, M. Adrian and Rodriguez, C. E. and Mena, R. H. and Velasco-Hernández, Jorge X. (2022). COVID-19 epidemic scenarios into 2021 based on observed key super-dispersion events, under revision. [medRxiv](https://medRxiv.org).

## Proceedings and book chapters (peer reviewed)

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[1]: Rodríguez, C. E. (2022). Estimating the Composition of the Chamber of Deputies in the Quick Count for the 2021 Federal Election in Mexico, Springer Proceedings in Mathematics & Statistics, Ed. Springer, to appear.

[2]: Rodríguez, C. E. and Mena, R. H. (2022). Chapter 2: Statistical modeling to understand the COVID-19 pandemic en Mathematical Modelling, Simulations, and AI for Emergent Pandemic Diseases, Ed. Elsevier. to appear.

## Books (only in Spanish)

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[1]: Franco, J., Sánchez, M. C., Reynoso, E., Namihira, R., Rodríguez, C. E., Villarreal, E. M., Pavón, C., Morales, A., Macias, P., Peña, R., (2015). Ciencia y tecnología: una mirada ciudadana. En la colección *Los mexicanos vistos por sí mismos. Los grandes temas nacionales*, UNAM, México. ISBN: 978-607-02-6987-5

[2]: Bensusán, G. y Valenti, G. (Coordinadoras), Grass, N., Inclán, D., Rodríguez, C. E., Varela, G. (2018). La evaluación de los académicos: Instituciones y Sistema Nacional de Investigadores, aciertos y controversias, FLACSO-UAM, México. ISBN 978-607-8517-21-3 (Flacso México) y 978-607-28-1263-5 (UAM)

## Teaching

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**Courses at UAM, trimester based programs:** Statistical Inference [BSc. in Mathematics] (2016-3), Statistics I [BBA] (2016-3), Regression [BSc. in Mathematics] (2017-1), Statistics III [BBA] (2017-2), Mathematics I [BBA] (2017-2), Statistics III [BSc. Social Psychology] (2018-1), Biostatistics [BSc. in experimental Biology] (2018-2) and Simulation [MSc. Applied Maths] (2017-3, 2018-2).

**Courses at UNAM, semester based programs:** Statistical Inference [BSc. in Actuary] (2017-1), Bayesian Nonparametrics [MSc. in Mathematics] (2019-2), Regression [BSc. in Actuary] (2019-1), Statistical Methods [BSc. in Data Science] (2020-2, 2021-2 and 2022-2) and Statistical Inference [MSc. in Mathematics] (2020-1, 2021-1, 2022-1 and 2023-1).

## Students

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### Master's degree

1. **Jerónimo Hernández Mendoza:** MSc. in Applied Mathematics, UAM, 2019 (*Thesis*).
2. **José Fuentes:** MSc. in Mathematics, UNAM, 2022 (*Dissertation*).
3. **Edgar Gerardo Alarcón:** MSc. in Mathematics, UNAM, (*Thesis under revision*).
4. **José Alberto Florencio Chávez:** MSc. in Mathematics, UNAM (*Ongoing Thesis*).
5. **Frank Rafael Gamboa:** MSc. in Mathematics, UNAM (*Ongoing Thesis*)

Bachelor's degree

1. **Vanessa Itzel Soulé Flores**: BSc. in Mathematics, UNAM (*Thesis under revision*).

## **Awards**

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**SNI-CONACyT**: National System of Researchers. Level I, 2016-2018 and 2022- to date.

## **Talks and posters**

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**November, 2016**: Symposium on Statistical Inference and Modeling, CIMAT, Guanajuato, Mexico.

Talk "Label Switching in Bayesian Mixture Models: deterministic relabeling strategies"

**June, 2011**: 8<sup>th</sup> International conference in Bayesian nonparametrics, Veracruz, Mexico, Talk:

"Bayesian nonparametric mixture modeling with unimodal kernels"

**August, 2011**: The R user conference, University of Warwick, Coventry, UK. Poster "Bayesian nonparametric mixture modeling with unimodal kernels"

**June, 2009**: 7<sup>th</sup> International conference in Bayesian non-parametrics, University of Turin, Italy.

Poster "Some ideas in trans-dimensional MCMC"