Laura M. Guzmán-Rincón

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Current Appointments

Postdoctoral Research Fellow, Warwick-Wellcome Translational Fellowship, University of Warwick. 2023.

Research Interests

Epidemiology and spatio-temporal analysis, Bayesian hierarchical models and MCMC methods, Gaussian processes for genetic, temporal, and spatial analysis, genomics and outbreak detection.

Education

2017–2020 **Ph.D. Mathematics of Systems** University of Warwick, UK
Statistical Methods for Campylobacter Outbreak Detection using Genomics and Epidemiological Data. Supervisors: Prof Noel McCarthy, Prof Simon Spencer.

2015–2016 **M.Sc. Mathematics of Systems (Distinction)** University of Warwick, UK
Individual project: *Detection of Campylobacter Outbreaks using Genomics and Epidemiological Data*. Supervisors: Prof Noel McCarthy, Prof Simon Spencer.
Group project: *UK Strategic Road Networks*

2008–2013 **B.Sc. Mathematics** Universidad de Los Andes, Colombia
Thesis: *Quantitative and Qualitative Approach to Information Theory and Entropy Estimators.* Supervisors: Dr Adolfo Quiroz, Dr Maricarmen Martinez.

2007–2011 **B.Sc. Physics** Universidad de Los Andes, Colombia
Thesis: *Extension of Classical Quantities to Quantum Information Theory.* Supervisors: Dr Alonso Botero.

Professional Experience

2023–2024 **Research Fellow - Warwick-Wellcome Translational Fellowship** UK
Current appointment funded by the Warwick-Wellcome Translational Fellowship at the University of Warwick.

2022–2023 **Research Fellow - KEMRI-Wellcome Trust** University of Warwick, UK
Developed quantitative tools aimed to tackle infectious disease outbreaks in Sub-Saharan Africa, as part of the KEMRI-Wellcome Trust Research Programme.

2021–2022 **Research Fellow - JUNIPER Consortium** University of Warwick, UK
Developed statistical models to monitor the dynamics of SARS-CoV-2 in the UK. Reported the findings of these models to SPI-M-O.

2017–2020 **Data Scientist (Part-Time)** Cappfinity, UK
Examined and developed mathematical models to extract information from and analyse diverse assessment data.

2018–2019 **Teaching Assistant** University of Warwick, UK
Led the *Analysis I* support classes for undergraduate students in Mathematics. Taught *Numerical Methods* to Masters students in Business.

2018–2019 **Undergraduate Supervisor - Mathematics Institute** University of Warwick, UK
Supervised second-year students of the Mathematics programme.

09/2016–02/2017	**Data Analyst - Internship**	Capp & Co, UK
	Designed adaptive algorithms to adjust psychological online tests, according to customers behaviour.	
2014–2015	**Researcher Scientist - Bank Research Group**	Davivienda Bank, Colombia
	Analysed, created and implemented mathematical models to solve the bank's immediate issues. Extracted real-time data from the bank databases. Implemented software that guided researchers in the design of scoring systems.	
05–11/2011	**Part-Time Teacher - Department of Physics**	Universidad de Los Andes, Colombia
	Planned lectures and supervised students in problem-solving sessions of classical mechanics, thermodynamics, and electromagnetism.	

Research Experience

02/2017-09/2020	**Statistical Methods for Campylobacter Outbreak Detection using Genomics and Epidemiological Data**	Ph.D. Project
	Proposed a novel framework for outbreak detection, mixing different types of data. The proposed classification model is based on Bayesian hierarchical models and Gaussian processes.	
04/2019	**Seals from Space: Automated Antarctic Ecosystem Monitoring via High-Resolution Satellite Imagery**	Data Study Group - The Alan Turing Institute
	Performed ecological analysis of seals based on their location, using Bayesian models. Project proposed by the British Antarctic Survey.	
09/2017	**Strategies in Railway Traffic Management**	European Study Group with Industry
	Predicted the propagation of delays through the railway system using Bayesian networks. Project proposed by Resonate.	
07–09/2016	**Detection of Campylobacter outbreaks**	M.Sc. Individual Project
	Developed two statistical and spatial methods to analyse genomic and epidemiological data, for the detection of outbreaks in Oxfordshire, UK. Project funded by the Food Standards Agency.	
03–06/2016	**UK Strategic Road Networks**	M.Sc. Research Study Group
	Extracted and analysed data, and designed algorithms to predict the duration of traffic jams in the UK. Project provided by Thales.	
05–11/2011	**Controlling Plant Pathogens using Bacteria**	iGEM Competition
	Member of Colombia's Team participating in the International Genetically Engineered Machine competition, as a part of the mathematical modelling group.	

Awards and Funding

2023	**Warwick-Wellcome Translational Fellowship Award**
	Research Fellow, University of Warwick.
2023	**STEM For Britain - Finalist**
	Houses of Parliament, UK.
2022	**SPI-M-O Award for Modelling and Data Support**
	Department of Health & Social Care, UK.
2022	**RAMP Outreach Innovation Award**
	RAMP (Rapid Assistance in Modelling the Pandemic) - The Royal Society.
2016–2020	**EPSRC Scholarship**
	PhD Funding, University of Warwick.

2017	**Cool Data of the Year award** Cappfinity, UK, 2017.
2015–2016	**Colfuturo Scholarship** MSc Funding, Colombia.
2007–2013	**Quiero Estudiar Scholarship** University of Los Andes, Colombia.
2011	**Bronze Award - International Genetically Engineered Machine Competition (iGEM)** Colombian team. Indiana University, USA.

Talks

2022	**Applications of the routine estimation of the instant growth rate of SARS-CoV-2 positive cases in England** Royal Society Modelling the COVID-19 pandemic: achievements and lessons, London, UK.
2021	**Bayesian estimation of the instantaneous growth rate of SARS-CoV-2 positive cases in England, using Gaussian processes** Invited to the Centre for the Mathematical Modelling of Infectious Diseases seminar, London School of Hygiene & Tropical Medicine.
2020	**Outbreak detection using Bayesian hierarchical modelling and Gaussian random fields** Mathematics of Data Science conference.
2019	**Campylobacter outbreak detection** Invited to the *Matemáticas por Estudiantes* conference, University of Los Andes, Colombia.
2019	**The armed conflict in Colombia, a data-driven perspective** Invited to Data Beers - Warwick.
2011	**Controlling plant pathogens using bacteria** iGEM World Jamboree, Massachusetts Institute of Technology.

Conferences

2023	**Bayesian Computation 2023** Levy, Finland
2022	**Royal Society Modelling the COVID-19 pandemic: achievements and lessons** London, UK
2022	**Modelling to Support Resilience for Pandemics – Open Questions** Cambridge, UK
2020	**Mathematics of Data Science conference** Virtual
2019	**Spatial Statistics: Towards Spatial Data Science** Sitges, Spain
2018	**Spatially Embedded Networks** Bristol, UK
2018	**Antimicrobial Resistance: Bacterial Genomics, Big Data and Emerging Technologies conference** Wellcome Genome Campus, UK
2018	**Bayesian Young Statisticians Meeting** University of Warwick, UK

2018	**IDDconf: A Conference on Infectious Disease Dynamics**
	Ambleside, UK
2017	**Spatial Statistics: One World: One Health**
	Lancaster, UK
2017	**Epidemics6**
	Sitges, Spain
2016	**CCS conference: Conference on Complex Systems**
	Amsterdam, Netherlands

Admin Experience

Since 2022	**SBIDER Podcast Hub co-host**
	The *SBIDER Podcast Hub* is a series of podcast including the *SBIDER Presents* and the *SBIDER Career Podcast*.
2019	**Organiser - MathSys Annual Retreat**
	Mathematics Institute, University of Warwick, UK
2018	**Media Support - Pint of Science**
	Coventry, UK.

Programming

Expert	R, MATLAB, SQL, Visual Basic.
Proficient	Python, C++, Java, Julia.

Languages

Advanced	English, Spanish (native speaker).
Intermediate	German, French, Catalan.

Publications

Pre-Prints

- Challen, R., et al., 2021. Early epidemiological signatures of novel SARS-CoV-2 variants: establishment of B.1.617.2 in England. *medRxiv* 2021.06.05.21258365. https://doi.org/10.1101/2021.06.05.21258365

- Keeling, M. et al., 2021, Short-term projections based on early omicron variant dynamics in England, *medRxiv* 10.1101/2021.12.30.21268307. https://doi.org/10.1101/2021.12.30.21268307

Publications

- Guzman-Rincon, L., et al., 2023. Bayesian Estimation of real-time Epidemic Growth Rates using Gaussian Processes: local dynamics of SARS-CoV-2 in England. *Journal of the Royal Statistical Society Series C: Applied Statistics*, qlad056. https://doi.org/10.1093/jrsssc/qlad056

- Brand, S.P.C., et al., 2023. The role of vaccination and public awareness in medium-term forecasts of monkeypox incidence in the United Kingdom. *Nature Communications*, 14, 4100. https://doi.org/10.1038/s41467-023-38816-8

- Toloza O, et al., 2023. The C/N ratio from FUV spectroscopy as a constraint on evolution of the dwarf nova HS 0218+ 3229, *Monthly Notices of the Royal Astronomical Society*, Volume 523, Issue 1, July 2023, Pages 305–326, https://doi.org/10.1093/mnras/stad1306