

# Shu Wei Chou Chen

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## EDUCATION

- 2016 – 2020    📖 **Ph.D. in Statistics.** University of São Paulo (São Paulo, Brazil).  
Thesis title: *Locally Stationary Processes with Stable and Tempered Stable Innovation*.  
Advisor: Prof. Dr. Pedro A. MORETTIN.
- 2012 – 2015    📖 **M.Sc. in Statistics.** University of Costa Rica (San José, Costa Rica).  
Thesis title: *Un modelo jerárquico Bayesiano espacio-temporal con variable respuesta de Poisson: aplicación al caso de VIH/SIDA como enfermedad rara en Costa Rica*.  
Advisor: Prof. Dr. Ricardo ALVARADO.
- 2008 – 2012    📖 **BS. in Statistics.** University of Costa Rica (San José, Costa Rica).

## Employment History

- March 2022 – present    📖 **Assistant Profesor.** School of Statistics, University of Costa Rica (UCR), San José, Costa Rica.
- March 2020 – present    📖 **Researcher.** Center for Research in Pure and Applied Mathematics (CIM-PA), UCR.
- March 2020 – March 2022    📖 **Invited Profesor.** School of Statistics, UCR.
- 2012 – 2015    📖 **Lecturer.** School of Statistics, UCR.

## TEACHING EXPERIENCE

- March 2020 – present    📖 *School of Statistics, University of Costa Rica.*
- *Undergraduate level in Statistics:* Statistical Theory, Professional Practice I and II, Time Series Analysis.
  - *Graduate level in Statistics and Mathematics:* Time Series I and II.
- February 2017 – December 2019    📖 *Institute of Mathematics and Statistics, University of São Paulo.* Assistant in the courses of:
- *Statistics for other majors:* Introduction to Probability and Statistics.
  - *Graduate level in Statistics:* Time Series, Spectral Analysis of Time Series, Financial Time Series Modeling.

March 2012 – March 2015

■ *School of Statistics, University of Costa Rica.*

- *Statistics for other majors:* Economic, Social and Biological Sciences.
- *Undergraduate level:* Probability and Statistics Theory.
- *Graduate level in Statistics:* Experimental Design, Regressions, and Statistical Methods.

## EXPERIENCE IN RESEARCH PROJECTS

### As Principal Investigator:



- 2024-present ■ Análisis espacio-temporal del impacto de factores climáticos y de contaminación sobre las hospitalizaciones respiratorias. *School of Statistics, University of Costa Rica (UCR).*
- 2023-present ■ Desarrollo de modelos aditivos con errores simétricos autorregresivos para series temporales: generalizaciones y los métodos de pronósticos. *Center for Research in Pure and Applied Mathematics (CIMPA), UCR.*
- 2015-2016 ■ Análisis espacio-temporal de VIH/SIDA en Costa Rica. *Central American Population Center (CCP), UCR.*

### As Associate Researcher:

- 2023-present ■ Potencial aumento del riesgo en Costa Rica y Nicaragua por causa de ciclones tropicales en el Caribe. *Center for Geophysical Research (CIGEFI), UCR.*
- El costo de una vida digna en Costa Rica. Ingreso vital y la construcción de metodologías para el cálculo de variaciones subnacionales. *Institute of Social Research (IIS), UCR.*
- Uso de modelos de aprendizaje automático para el pronóstico de caudales extremos (mínimos y máximos). *CIMPA, UCR.*
- Análisis de extremos espacio-temporales con modelos bayesianos jerárquicos. *CIMPA, UCR.*
- El efecto de Los determinantes sociales en la propagación de enfermedades infecciosas. *CIMPA, UCR.*
- 2022-2023 ■ Use of machine learning as a predictive tool for vector-borne diseases in Costa Rica. *CIMPA, UCR.*
- 2020-2023 ■ Desarrollo e implementación eficiente de modelos para procesos espacio-temporales a través de la aproximación de resolución múltiple. *CIMPA, UCR.*
- 2014 ■ Determinación de líneas base en indicadores para evaluar el manejo integrado de recursos marino-costeros en Costa Rica. *Center for Research in Marine and Limnological Sciences (CIMAR), UCR.*

## PUBLICATIONS

### Journal articles:


- 1 **S. W. Chou-Chen** y L. A. Barboza, «Forecasting hospital discharges for respiratory conditions in Costa Rica using climate and pollution data,» *Mathematical Biosciences and Engineering*, vol. 21, n.º 7, págs. 6539-6558, 2024, ISSN: 1551-0018.  DOI: 10.3934/mbe.2024285.
- 2 **S. W. Chou-Chen**, R. A. Oliveira, I. Raicher y G. A. Paula, «Additive partial linear models with autoregressive symmetric errors and its application to the hospitalizations for respiratory diseases,» *Statistical Papers*, 2024.  DOI: 10.1007/s00362-024-01590-w.

- 3 L. A. Barboza, **S. W. Chou-Chen**, M. Alfaro Córdoba, E. J. Alfaro y H. G. Hidalgo, «Spatio-temporal downscaling emulator for regional climate models,» *Environmetrics*, vol. 34, n.º 7, e2815, 2023.  DOI: 10.1002/env.2815.
- 4 L. A. Barboza, **S. W. Chou-Chen**, P. Vásquez, Y. E. García, J. G. Calvo, H. G. Hidalgo y F. Sanchez, «Assessing dengue fever risk in Costa Rica by using climate variables and machine learning techniques,» *PLOS Neglected Tropical Diseases*, vol. 17, págs. 1-13, ene. de 2023.  DOI: 10.1371/journal.pntd.0011047.
- 5 **S. W. Chou-Chen**, L. A. Barboza, P. Vásquez, Y. E. García, J. G. Calvo, H. G. Hidalgo y F. Sanchez, «Bayesian spatio-temporal model with INLA for dengue fever risk prediction in Costa Rica,» *Environmental and Ecological Statistics*, vol. 30, n.º 4, págs. 687-713, dic. de 2023, ISSN: 1573-3009.  DOI: 10.1007/s10651-023-00580-9.
- 6 **S. W. Chou-Chen** y P. A. Morettin, «A two-step estimation procedure for locally stationary ARMA processes with tempered stable innovations,» *Brazilian Journal of Probability and Statistics*, vol. 37, n.º 1, págs. 155-176, 2023.  DOI: 10.1214/23-BJPS565.
- 7 Y. E. García, **S. W. Chou-Chen**, L. A. Barboza, M. L. Daza-Torres, J. C. Montesinos-López, P. Vásquez, J. G. Calvo, M. Nuño y F. Sanchez, «Common patterns between dengue cases, climate, and local environmental variables in Costa Rica: A wavelet approach,» *PLOS Global Public Health*, vol. 3, n.º 10, págs. 1-22, oct. de 2023.  DOI: 10.1371/journal.pgph.0002417.
- 8 S. Gómez-Campos, M. Cubero-Corella, M. F. Salas García y **S. W. Chou-Chen**, «Patrones de movilidad en tiempos de COVID-19: un enfoque con big data,» *Epi-SCIENCE*, vol. 1, n.º 1, jun. de 2023.  DOI: 10.15517/es.2023.55398.
- 9 P. Vásquez, F. Sanchez, L. A. Barboza, Y. E. García, J. G. Calvo, **S. W. Chou-Chen** y G. Mery, «Mathematical and statistical models for the control of mosquito-borne diseases: the experience of Costa Rica,» *Rev Panam Salud Publica*, vol. 113, n.º 46, 2022.  DOI: <https://doi.org/10.26633/RPSP.2022.113>.
- 10 **S. W. Chou-Chen** y P. A. Morettin, «Indirect inference for locally stationary ARMA processes with stable innovations,» *Journal of Statistical Computation and Simulation*, vol. 90, n.º 17, págs. 3106-3134, 2020.  DOI: 10.1080/00949655.2020.1797030.
- 11 **S. W. Chou-Chen** y R. Alvarado-Barrantes, «Un Modelo jerárquico Bayesiano espacio-temporal con variable de conteos: aplicación de VIH/SIDA en Costa Rica,» *Comunicaciones En Estadística*, vol. 11, n.º 1, págs. 9-35, 2018. eprint: <https://doi.org/10.15332/s2027-3355.2018.0001.01>.
- 12 **S. W. Chou** y E. E. Gutiérrez-Espeleta, «Ecuación para estimar la biomasa arbórea en los bosques tropicales de Costa Rica,» *Revista Tecnología En Marcha*, vol. 26, n.º 2, págs. 41-54, 2013. eprint: <https://doi.org/10.18845/tm.v26i2.1402>.  dirección: [https://revistas.tec.ac.cr/index.php/tec\\_marcha/article/view/1402](https://revistas.tec.ac.cr/index.php/tec_marcha/article/view/1402).

## Other publications:

- 1 **S. W. Chou-Chen** y O. Hernández, *Teaching basic statistics to blind students*, ISLP Newsletter of the International Statistical Literacy Project. <https://iase-web.org/islp/documents/Newsletters/ISLP%20Newsletter%20Vol%209.2%20December%202017.pdf>, dic. de 2017.

## CONFERENCES

- 2024  **Simposio Internacional sobre Métodos Matemáticos Aplicados a las Ciencias, SIMMAC XXIV**, Universidad de Costa Rica, Liberia, Costa Rica. “Modelos lineales parciales aditivos con error simétrico autorregresivo para datos de series temporales.” (Conference, Invited Talk).

- 2023  **XII Foro Internacional de Estadística Aplicada.** Facultad de Estadística e Informática, Universidad Veracruzana, Xalapa-Enríquez, Veracruz, México. “*Modelos predictivos aplicados a datos climáticos y dengue: un enfoque espacio-temporal y de aprendizaje de máquinas.*” (Conference, Invited Talk).
- 2022  **XV Jornadas de Análisis Estadístico.** Escuela de Estadística, UCR. “*Predicción de los riesgos de dengue en Costa Rica mediante el uso de variables climáticas y técnicas de aprendizaje automático.*” (Conference, Invited Talk).
-  **Workshop on climate change, human behavior, and vector-borne diseases.** Department of Public Health Sciences, University of California, Davis, California, United States. “*Assessing dengue fever risk in Costa Rica by using climate variables and machine learning techniques.*” (Workshop, Invited Talk).
- 2021  **Seminar.** Escuela de Estadística, UCR, San José, Costa Rica. “*Processos localmente estacionarios con innovaciones estables y estables temperadas.*” (Seminar, Invited Talk).
-  **Seminar.** Universidade Federal do Rio Grande do Norte, Natal, Brasil. “*Processo  $\alpha$ —estável localmente estacionário.*” (Seminar, Invited Talk).
-  **Seminar.** CIMPA-UCR, San José, Costa Rica. “*Proceso localmente estacionario con innovaciones estables*” (Seminar, Invited Talk).
- 2019  **Seminar.** Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul, Brasil. “*Processo  $\alpha$ —estável localmente estacionário.*” (Seminar, Invited Talk).
-  **18th ESTE - Time Series and Econometrics Meeting.** Gramado, Rio Grande do Sul, Brasil. “*Locally stationary ARMA processes with tempered stable innovations.*” (Conference, Contributed Talk).
-  **XVI EMR - Escola de Modelos de Regressão.** Pirenópolis, Goiás, Brasil. “*Indirect estimation for  $\alpha$ -stable time-varying ARMA processes.*” (Conference, Contributed Talk).
- 2018  **23° SINAPE - Simpósio Nacional de Probabilidade e Estatística.** São Pedro, São Paulo, Brasil. “*Indirect estimation for alpha-stable time-varying AR(1) processes.*” (Conference, Contributed Talk).
- 2017  **61st World Statistics Congress.** Marrakech, Marruecos. “*Teaching Basic Statistics to Blind Students.*” (Congress, Poster Presentation).
-  **XV EMR - Escola de Modelos de Regressão.** Goiania, Goiás, Brasil. “*Time series analysis on the Global Mean Sea Level.*” (Conference, Poster Presentation).
-  **XVII Escola de Séries Temporais e Econometria.** (Conference, Passive Participation).
- 2015  **RSS 2015 Annual Conference.** University of Exeter. “*A simulation study of spatio-temporal Bayesian models with Poisson response.*” (Conference, Poster Presentation).
-  **60th World Statistics Congress.** International Statistical Institute (Congress, Passive Participation).
- 2014  **Joint Statistical Meeting.** American Statistical Association (Congress, Passive Participation).
- 2013  **Primer Simposio Centroamericano de Estadística Bayesiana.** Universidad de Costa Rica. “*Análisis espacial Bayesiano de tasas de homicidios cantonales en Costa Rica.*” (Symposium, Contributed Talk).
-  **XII Jornadas de análisis estadístico.** Universidad de Costa Rica (Conference, Passive Participation).
- 2010  **XI Jornadas de análisis estadístico.** Universidad de Costa Rica (Conference, Passive Participation).

## ADMINISTRATIVE AND ACADEMIC MANAGEMENT EXPERIENCE

- 2022-present
  - Representative of the Graduate Program in Statistics on the Advisory Council of the Research Center for Development Observatory (CIOdD), UCR.
  - Representative of the Graduate Program in Statistics on the Scientific Council of CIOdD, UCR.
- 2020-present
  - Coordinator of the Evaluation, Guidance, and Student Affairs Committee at the School of Statistics, UCR.
  - Member of the Master's Program in Statistics Committee, UCR.
- 2020-2022
  - Coordinator of the Professional Practice in the Bachelor's Program in Statistics.

## AWARDS AND HONORS

- UCREA Grant for the project: *"Potencial aumento del riesgo en Costa Rica y Nicaragua por causa de ciclones tropicales en el Caribe."* Participation as an associate researcher during 2023-2025.
- UCREA Grant for the project: *"El costo de una vida digna en Costa Rica. Ingreso vital y la construcción de metodologías para el cálculo de variaciones subnacionales."* Participation as an associate researcher during 2023-2025.
- Second place for Best Thesis Award (2019-2020) from the Brazilian Statistical Association, Brazil.
- First place for the best poster titled: *"Indirect estimation for  $\alpha$ -stable time-varying  $AR(1)$  processes"* at the 23<sup>rd</sup> SINAPE - National Symposium on Probability and Statistics in São Pedro, São Paulo, Brazil, 2019.
- Graduation with honors in the Academic Master's in Statistics, 2015. University of Costa Rica.
- Graduation with honors in the Bachelor's in Statistics, 2012. University of Costa Rica.
- Highest GPA in the Bachelor's in Statistics program, 2010. University of Costa Rica.
- Highest GPA in the Bachelor's in Statistics program, 2009. University of Costa Rica.

## OTHER PROFESSIONAL ACTIVITIES

### Editorial Board of Journals

- 2022-present. ■ Member of the Editorial Board of Revista Epi-Science.
- 2020-present. ■ Member of the Editorial Board of Revista de Matemática: Teoría y Aplicaciones.

### Workshops and Short Courses Taught





- May 2023 ■ *Statistical Modeling and Machine Learning Applied to Climatic Data and Public Health*, Faculty of Statistics and Informatics, Universidad Veracruzana (10 hours)
- January 2016 ■ *Data Mining*, University of Costa Rica (16 hours)
- September 2014 ■ *Introduction to R*, University of Costa Rica (16 hours)
- October 2015 ■ *Introduction to R*, University of Costa Rica (16 hours)

### Research Stays and Academic Visits

- September 2014 ■ Department of Educational Psychology, University of Minnesota, United States. *Active Approach in Teaching Statistics* with Dr. Robert DelMas.




### Courses and Certifications

- 2019 ■ IX WWlet – Workshop in Wavelets and Applications. Gramado/RS, Brazil. *Multiscale Analysis and Wavelets: Theory, Development, and Applications*.
- School of Regression Models. Pirenópolis/GO, Brazil. *Count Data Regression Models: Over- and Under-dispersion*.




- 2018  23rd National Symposium on Probability and Statistics – SINAPE. São Pedro/SP, Brazil:
- *Binary Regression Models: Inference and Applications.*
  - *Bayesian Distributional Regression.*
- 2017  XVII ESTE Brazilian School of Time Series and Econometrics, São Carlos, Brazil. *Statistical Inference for Nonstationary Time Series: Functional Data Analysis and Bootstrap perspectives.*
- 2014  School of Statistics, University of Costa Rica. *Time Series with Financial Data.*
-  JSM Professional Development, Joint Statistical Meeting, Boston, United States. *Hierarchical Bayesian Modeling and Analysis for Spatial Data.*

## PARTICIPATION IN THESES AND GRADUATION PROJECTS

### Thesis Advisor:

- May 2024  “Análisis de los casos de intoxicación reportados al Centro Nacional de Control de Intoxicaciones de Costa Rica durante el periodo de COVID-19 entre los años 2020 y 2022.” Professional Master’s Degree in Statistics of Edgardo Gutiérrez Vega.
- July 2022  “Modelo bayesiano espacio-temporal predictivo acumulado de personas fallecidas de Covid-19 por cantones en Costa Rica durante el mes de mayo de 2021.” Professional Master’s Degree in Statistics of Ricardo Zamora Mennigke.
- January 2022  “Nexo entre crecimiento económico y desarrollo del sistema financiero: Análisis de cointegración y series de tiempo para el caso de CR.” Professional Master’s Degree in Statistics of Fabián Brenes Trejos.

### Thesis Reader:

- March 2024  “Factores asociados a la posibilidad de impago por parte de los deudores en materia de Pensiones Alimentarias.” Professional Master’s Degree in Statistics of Juan Pablo León Cerdas.
- December 2022  “Comparison of evaluation methods for global climate models for Central America.” Academic Master’s Degree in Statistics of Mario Javier Gómez Camacho.
-  “La sobreparametrización en el ARIMA: una aplicación a datos costarricenses.” Academic Master’s Degree in Statistics of César Andrés Gamboa Sanabria.

## SKILLS

### Languages:

- Spanish (near-native)
- Mandarin (native)
- English (advanced)
- Portuguese (advanced)

**Statistical Programs:** R, SPSS, JMP, STATA, CPro, Eviews, Winsteps, OpenBUGS.