

# Shu Wei Chou Chen

Escuela de Estadística

Centro de Investigación en Matemática Pura y Aplicada

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🌐 <https://shuwei325.github.io/>

## 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).

## PROFESSIONAL EXPERIENCE

- October 2024 – present      ■ **Subdirector.** Master's Program in Statistics, University of Costa Rica (UCR), San José, Costa Rica.
- November 2023 – present      ■ **Associate Professor.** School of Statistics, UCR.
- March 2020 – present      ■ **Researcher.** Center for Research in Pure and Applied Mathematics (CIMPA), UCR.
- March 2022 – November 2023      ■ **Assistant Professor.** School of Statistics, UCR, San José, Costa Rica.
- March 2020 – March 2022      ■ **Invited Professor.** 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 Analysis, Advanced topics in Time Series, 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.

- *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:

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

### As Associate Researcher:

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

## PUBLICATIONS

### Journal articles:

- 1 H. G. Hidalgo, **S. W. Chou-Chen**, K. A. McKinnon et al., «Detection and attribution of trends of meteorological extremes in Central America,» *Climatic Change*, vol. 178, n.º 5, pág. 95, 2025, ISSN: 1573-1480. DOI: Hidalgo2025.
- 2 **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.

- 3 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*, vol. 65, n.º 8, págs. 5145-5166, 2024, ISSN: 1613-9798. DOI: [10.1007/s00362-024-01590-w](https://doi.org/10.1007/s00362-024-01590-w).
- 4 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](https://doi.org/10.1002/env.2815).
- 5 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](https://doi.org/10.1371/journal.pntd.0011047).
- 6 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](https://doi.org/10.1007/s10651-023-00580-9).
- 7 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](https://doi.org/10.1214/23-BJPS565).
- 8 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](https://doi.org/10.1371/journal.pgph.0002417).
- 9 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](https://doi.org/10.15517/es.2023.55398).
- 10 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>.
- 11 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](https://doi.org/10.1080/00949655.2020.1797030).
- 12 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>.
- 13 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).

## Conference Proceedings

- 1 J. P. Arroyo-Castro y S. W. Chou-Chen, «Unsupervised Detection of Anomaly in Public Procurement Processes,» en *Data Science, Classification, and Artificial Intelligence for Modeling Decision Making*, J. Trejos, T. Chadjipadelis, A. Grané y M. Villalobos, eds., Cham: Springer Nature Switzerland, 2025, págs. 23-32, ISBN: 978-3-031-85870-3.

## 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
- **Interim Conference of the Asian Regional Section of the International Association for Statistical Computing (IASC-ARS Interim Conference 2024).** "Additive partial linear models with autoregressive symmetric errors and its application to the hospitalizations for respiratory diseases." (Conference, Contributed Talk).
  - **Seminar.** Department of Statistics and Institute of Data Science, National Cheng Kung University, Tainan, Taiwan. "Additive Partial Linear Models with Autoregressive Symmetric Errors and Its Forecast Methods." (Seminar, Invited Talk).
  - **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 estacionários com innovações estáveis e estabas 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).
- 2018
- **XVI EMR - Escola de Modelos de Regressão.** Pirenópolis, Goiás, Brasil. "Indirect estimation for  $\alpha$ -stable time-varying ARMA processes." (Conference, Contributed Talk).
  - **23º 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

- 2024-present      ■ Subdirector, Master's Program in Statistics, UCR.
- 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.

## **Journal Review:**

- Climate Risk Management, Plos One, Scientific Report, and Revista de Matematica: Teoria y Aplicaciones.

## **Workshops and Short Courses Taught**

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

## **Research Stays and Academic Visits**

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| December 2024  | ■ Institute of Statistical Science, Academia Sinica, Taipei, Taiwan.<br>■ Department of Statistics and Institute of Data Science, National Cheng Kung University, Tainan, Taiwan. |
| September 2014 | ■ Department of Educational Psychology, University of Minnesota, United States. <i>Active Approach in Teaching Statistics</i> with Dr. Robert DelMas.                             |

## **Courses and Certifications**

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| 2019 | ■ IX WWlet – Workshop in Wavelets and Applications. Gramado/RS, Brazil. <i>Multiscale Analysis and Wavelets: Theory, Development, and Applications</i> .<br>■ School of Regression Models. Pirenópolis/GO, Brazil. <i>Count Data Regression Models: Over- and Under-dispersion</i> . |
| 2018 | ■ 23rd National Symposium on Probability and Statistics – SINAPE. São Pedro/SP, Brazil: <ul style="list-style-type: none"><li>■ <i>Binary Regression Models: Inference and Applications</i>.</li><li>■ <i>Bayesian Distributional Regression</i>.</li></ul>                          |
| 2017 | ■ XVII ESTE Brazilian School of Time Series and Econometrics, São Carlos, Brazil. <i>Statistical Inference for Nonstationary Time Series: Functional Data Analysis and Bootstrap perspectives</i> .  |
| 2014 | ■ School of Statistics, University of Costa Rica. <i>Time Series with Financial Data</i> .<br>■ JSM Professional Development, Joint Statistical Meeting, Boston, United States. <i>Hierarchical Bayesian Modeling and Analysis for Spatial Data</i> .                                |

## **PARTICIPATION IN THESES AND GRADUATION PROJECTS**

### **Thesis Advisor:**

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| July 2025 | ■ “ <i>Modelo de la influencia de los factores climáticos y la contaminación del aire en la incidencia de enfermedades respiratorias en las regiones y subregiones climáticas de Costa Rica</i> .” Professional Master’s Degree in Mathematical Methods and Application of Emmanuel Parra Rodríguez. |
| June 2025 | ■ “ <i>Modelos de cambio de régimen de Markov aplicados a temperatura del agua de ríos en el macizo Cerro de la Muerte, Costa Rica</i> .” Professional Master’s Degree in Statistics of Paola Campos Arce.   |

- August 2024 ━━━━ “Comparación de técnicas de análisis multivariado para detección de valores extremos con técnicas no supervisadas, una aplicación al caso de anomalías en contratación de bienes en Costa Rica.” Academic Master’s Degree in Statistics of Jose Pablo Arroyo Castro.
- May 2024 ━━━━ “Análisis de los casos de intoxicación reportados al Centro Nacional de Control de Intoxicaciones de Costa Rica durante el período 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.

## SKILLS

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**Languages:** Spanish (near-native), Mandarin (native), English (advanced), and Portuguese (advanced).

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