# CARLOS MISAEL MADRID PADILLA


**CONTACT INFORMATION**

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**EMPLOYMENT**

Assistant Professor — Starting July 2024
Department of Statistics
Washington University in St. Louis

**EDUCATION**

Ph.D., Mathematics, The University of Notre Dame — Aug 2019-Present
Advisor: Lizhen Lin and Daren Wang
GPA: 3.9/4

M.S., Mathematics, The University of Notre Dame — Aug 2019-Jun 2021
Advisor: Alex Himonas
GPA: 3.9/4

Bachelor in Mathematics, The Universidad de Guanajuato — Aug 2014-Jun 2019
Advisor: Victor Perez Abreu and Mario Diaz Torres
GPA: 9.37/10

**RESEARCH INTERESTS**

Network analysis, change-point detection in time series, functional data analysis, graphical models, nonparametric statistics, and bayesian statistics.

**PUBLICATIONS**

"Change point detection and inference in multivariable nonparametric models under mixing conditions" **Carlos-Misael Madrid-Padilla**, Haotian Xu, Daren Wang, Oscar Hernan Madrid Padilla, and Yi Yu. ***NeurIPS***. 2023.

"Change-point detection for sparse and dense functional data in general dimensions." **Carlos-Misael Madrid-Padilla**, Daren Wang, Zifeng Zhao, and Yi Yu. ***NeurIPS***. 2022.

"The Neumann and Robin problems for the Korteweg-de Vries equation on the half-line". Alexandrou Himonas, **Carlos-Misael Madrid-Padilla**, and Fangchi Yan (alphabetical order). ***Journal of Mathematical Physics, 62, 111503***. 2021. (selected as Editors' Pick)

**PREPRINTS**

"Temporal-spatial model via Trend Filtering" **Carlos-Misael Madrid-Padilla**, Oscar Hernan Madrid Padilla, and Daren Wang. ***Under Review***. 2023. ***arxiv:2308.16172***.

"Robust and Scalable Variational Bayes" **Carlos-Misael Madrid-Padilla**, Shitao Fan, and Lizhen Lin. ***In Progress***. 2023+.

"Distributional regression via Neural Networks" **Carlos-Misael Madrid-Padilla** and Oscar Hernan Madrid Padilla. ***In Progress***. 2023+.

"Distributional regression: Trend Filtering and beyond" **Carlos-Misael Madrid-Padilla**, Oscar Hernan Madrid Padilla, and Sabyasachi Chatterjee. ***In Progress***. 2023+.

"Dense neural networks for temporal spatial model on Manifolds" Ke Xu, **Carlos-Misael Madrid-Padilla**, Daren Wang, and Oscar Hernan Madrid Padilla. ***In Progress***. 2023+.

"Risk Bounds for Quantile Temporal-Spatial Analysis" Zhi Zhang, Kyle Ritcher, **Carlos-Misael Madrid-Padilla**, and Oscar Hernan Madrid Padilla. ***In Progress***. 2024+.

"Minimax lower bound for variance-reduced sketching nonparametric estimation" Dailin Gan, **Carlos-Misael Madrid-Padilla**, Daren Wang, and Oscar Hernan Madrid Padilla. ***In Progress***. 2024+.

## RESEARCH EXPERIENCE

***Research Assistant*** Jul 2018-Jul 2019
**Center for Research in Mathematics (CIMAT A.C.)**
Advisor: Victor Perez Abreu
Project for Senior Thesis: "Analysis Based on Random Matrices and Free Probability of the Dynamics of Generalization of Neural Networks"

***Research Experience for Undergraduates*** Jul 2018-Aug 2018
**Center for Research in Mathematics (CIMAT A.C.)**
Advisor: Victor Perez Abreu
Directed readings on Artificial Neural Networks and their relationship with random matrices, and programming computer simulations.

## TEACHING EXPERIENCE

*Instructor*, at The University of Notre Dame:

- Introduction to Linear Algebra and Differential Equations (Math 20580)
  Summer 2023
  My Instructor Rating: 4.8 out of 5 (median)
  Response Rate = 90%
  Class size: 15.

- Introduction to Linear Algebra and Differential Equations (Math 20580)
  Summer 2022
  My Instructor Rating: 4.7 out of 5 (median)
  Response Rate = 76.9%
  Class size: 13.

- Elements of Calculus I (Math 10250)
  Fall 2021
  My Instructor Rating: 4.2 out of 5 (median)
  Response Rate = 93.9%
  Class size: 66.

- Introduction to Linear Algebra and Differential Equations (Math 20580)
  Summer 2021
  My Instructor Rating: 5 out of 5 (median)

Response Rate = 71.4%
Class size: 14.

*Teaching Assistant*, at The University of Notre Dame, for the following courses:

Glynn Math Seminar II, Principles of Calculus, Introduction to Linear Algebra and Differential Equations, Elements of Calculus I.

*Teaching Assistant*, at The Universidad de Guanjuato, for the following courses:

Linear Algebra I, Projective Geometry and Measure Theory I.

**AWARDS**

- Graduate School Fellowship, The University of Notre Dame.
  August 2021 - May 2022.
- Graduate School Fellowship, The University of Notre Dame.
  Summer 2021
- Research assistant scholarship, CIMAT.
  July 2018 - July 2019.
- Excellence Scholarship, Mathematical Research Center (CIMAT, Mexico).
  August 2014 - June 2019.
- Honorable mention, for best undergraduate thesis in mathematics at Mexican Mathematical Society, 2020.
- Honorable mention, Ibero–American Mathematical Olympiad.
  2013.
- Gold Medal, Honduran Mathematical Olympiad.
  2010-2013.

**Coding skills**

Programming languages and mathematical packages: Python, R, C++, SQL and MATLAB.

**TALKS**

- Temporal-spatial Model via Trend Filtering. Seminar at Department of Statistics, University California, Riverside. 2024.
- Change point detection for nonparametric data. Seminar Series at Department of Statistics, The Ohio State University. 2024.
- Temporal-spatial Model via Trend Filtering. Statistics and Data Science Seminar at Department of Statistics and Data Science, Washington University in St. Louis. 2024.
- Analysis of the dynamics of learning and generalization of a certain neural network. Financial Mathematics Seminar at Department of Mathematics, University of Notre Dame. 2019.
- Adversary generative neural network. Deep Learning Seminar at the Research Center in Mathematics (CIMAT A.C.). 2019.
- Analysis of the dynamics of learning and generalization of a certain neural network. Deep learning Seminar at the Research Center in Mathematics (CIMAT A.C.). 2018.
- Waiting times in banks. IX Summer School of Probability and Statistics at the Research Center in Mathematics (CIMAT A.C.). 2016.

**Editorial service**

**Reviewer for**:

- Stat
- NeurIPS
- ICLR
- ICML
- Bernoulli

**Service and outreach**

University Tutoring Center at the University of Guanajuato, Mexico. Coordination of a group of students that gave their mandatory social university service as tutors at math to elementary, middle, and high school students. 2014 - 2019.

**REFERENCES**

Professor Lizhen Lin
University of Maryland
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Professor Daren Wang
University of Notre Dame
dwang24@nd.edu

Professor Yi Yu
University of Warwick
yi.Yu.2@warwick.ac.uk

Professor of the Practice Brian Mulholland
University of Notre Dame
bmulholland@nd.edu