

# Vicky R. Zhu

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## Education

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**University of Notre Dame** 2018 – 2023

GPA: 3.97/4.0

- Ph.D. in Applied and Computational Mathematics and Statistics May 2023
  - Advisor: Dr. Robert Rosenbaum
  - Research interests: Mathematical Modeling, Biological and Artificial Recurrent Neural Networks<sup>1</sup>, Machine Learning.

• M.S. Applied and Computational Mathematics and Statistics May 2020

**University of California, Berkeley** 2015 – 2018

GPA: 3.64/4.0

- B.A. in Mathematics August 2018
- B.A. in Statistics August 2018
- Exchange semester: University of Melbourne, Australia January – May 2018

**Pasadena City College** 2013 – 2015

GPA: 4.0/4.0 (Summa Cum Laude)

- A.A. in Natural Science August 2015
- Study abroad semester: University of Oxford, U.K. January – May 2015

## Position

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**Babson College** August 2023 – Present

Assistant Professor in MAST Division

- Research interests: Quantitative Methods, Machine Learning, Recurrent Neural Nets, Reinforcement Learning, Causal Inference, Natural Language Models.
- Courses taught:
  - AQM 2000 – Predictive Business Analytics (Fall 2023, Spring 2024, Fall 2024, Spring 2025, Fall 2025)
  - QTM 3601 – Deep Learning in Business (Spring 2025, Fall 2025)

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<sup>1</sup>[My dissertation](#): *Fixed Points, Learning, and Plasticity in Recurrent Neuronal Network Models*.

## Publications

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- Zhu, V., Hang H., Shen, Y., Cruz J., & Li, D. *Embed, Don't Emit: A representation learning approach to disclosure*. In Progress. 2025.
- Zhu, V., Rosenbaum R., & Ocker G, D. *Empirical scaling laws in recurrent balanced networks with conductance-based synapses*. In Progress. 2025.
- Ansari, S., Farhadi, F., & Zhu, V. *Patience-technician ratio in multi-appointment health systems with reinforcement learning*. In progress, 2025.
- Zhu, V., Wright, A., & Otto, P. *Mixing Time of the Generalized Rook's Walk*. In Progress. 2025.
- Zhu, V., Chan, E., & Su, B. *To Bootstrap or Not in Propensity Score Matching? Implications for Causal Inference in Economic Modelling*. Revision, 2025 ([link](#)).
- Xu, X., Zhu, V., Hong, Y., Mielke, J., Sohler, F., Kryukov, I., & Ghadessi, M. *Impact of Daily Activity and Sleep on Cardiovascular Disease Progression in Healthy Individuals and Patients with Heart Failure*. Submitted, Digital Biomarker, 2025.
- Hang H., Shen, Y., Zhu, V., Cruz J., & Li, D. *Chitchat with AI: Understand the supply chain carbon disclosure of companies worldwide through Large Language Model*. Submitted, International Transactions in Operational Research, 2025. ([link](#))
- Zhu, V. & Rosenbaum, R. *Learning Fixed Points of Recurrent Neural Networks by Reparameterizing the Network Model*. *Neuron Computations*, MIT Press, 2024. ([link](#))
- Zhu, V. & Rosenbaum, R. *Evaluating the extent to which homeostatic plasticity learns to compute prediction errors in unstructured neuronal networks*. *Journal of Computational Neuroscience*, 2022. ([link](#))
- Baker, C., Zhu, V., & Rosenbaum, R. *Nonlinear stimulus representations in neural circuits with approximate excitatory-inhibitory balance*. *PLOS Computational Biology*, 2020. ([link](#))
- Desgrotte, M., Senger, S., Soukup, D., & Zhu, V. *A General Framework for Studying Finite Rainbow Configurations*. Vol. 297, pp. 55–63. Springer, Cham, 2020. ([link](#))

## Teaching Experience

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### Babson College

2023 – Present

Assistant Professor

*Deep Learning in Business (in-person): Spring 2025 – Present*

*Predictive Business Analytics (in-person): Fall 2023 – Present*

- Introduced data management skills using R and Python.
- Undertake statistical analyses and employ machine learning techniques to generate predictions and inferences.
- Draw appropriate conclusions to make well-informed decisions in business applications.
- Effectively communicate in-text results through numerical, visual, algebraic, and verbal representations.

**Climatematch Academy**

Jun. – Aug. 2023

Megapot Tutorial Leader

*Computational Tools in Climate Science (online): Remote*

- Led a global-level course for two weeks by running tutorials covering the fundamentals of climate science data and research.
- Focused on hands-on practice using JupyterLab for different types of climate data.
- Introduced the climate system and its prediction through climate models and interpretation.
- Guided students from 7 countries in two groups with their climate research projects.

**University of Notre Dame, Mendoza College of Business**

2020 – 2023

Instructor

*Statistical Inference in Business (in-person): Spring 2021, 2022, 2023*

- Used sample information to make inferences about unknown populations in the business context.
- Taught conceptual understanding of probability distributions, ANOVA, and regressions using R.
- Organized in-class activities and group discussion for course projects.
- Median composite student evaluation reached as high as 5.0/5.0 in a class with 30 students.

**Saint Mary's College, Dept. of Mathematics and Computer Science**

Aug. – Dec. 2022

Adjunct Lecturer

*Finite Mathematics (in-person)*

- Worked part-time in a women's college to support women in STEM.
- Introduced set theory, counting techniques (permutation/combination), and probability measure.
- Performed statistical analyses and linear programming.

**University of Notre Dame, Dept. of ACMS**

2018 – 2020

Instructor

*Statistics for Business and Economics I (online): Summer 2020*

- Introduced probability concepts in business applications, including Bayes rule, random variables/distributions, and hypothesis testing.
- Provided graphical representations through a variety of software; taught practical use of Microsoft Excel.
- Developed weekly assignments and created videos, quizzes, and exams.

## Research Experience

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**Babson College**

2024 – Present

- Biological RNNs, Causal Inference, & Reinforcement Learning research

**University of Notre Dame, Dept. of Applied and Computational Mathematics and Statistics**

2018 – 2023

- Ph.D. Research Advisor: Prof. Robert Rosenbaum
- Mathematical analysis of biological and artificial recurrent neuronal networks

**University of California, Berkeley, Dept. of Mathematics & Statistics** 2016 – 2018

- Honor Thesis Advisor: Prof. David Aldous
- Mathematical modeling to predict Oscar Awards

**Missouri State University, Dept. of Mathematics and Statistics** Jun. – Aug. 2017

- Research Experiences for Undergraduates (REU) Advisor: Prof. Steven Senger
- Participated in algebraic combinatorics questions

**Willamette University, Dept. of Mathematics** Jun. – Aug. 2016

- Research Experiences for Undergraduates (REU) Advisor: Prof. Peter Otto
- Participated in mixing time of Markov chain research problems

## Professional Experience

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**Wells Fargo** June 2023  
Quantitative Specialist

- Built a quantitative model framework to forecast the Daily Bank Deposit Sweep Balance (DBDSB), replacing an existing qualitative method (R replacing Excel).
- Developed four competitive pattern-based time series models to significantly improve DBDSB predictions.

**Dow Chemical** August 2022  
Data Scientist (intern)

- Built a module of several machine learning algorithms for chemical components using Python.
- Benchmarked against existing models using DataRobot.

**Bayer** June 2021, 2022  
Data Scientist / Statistician (intern)

- Evaluated partial least squares (PLS) methods and implemented dynamical-inner PLS algorithm in synthetic data (Python).
- Performed survival and clustering analysis using UK-biobank sleeping data (R).

**Federal Reserve Bank of Chicago** May 2021  
Risk Specialist Data Analysis Contractor

- Built supervised and unsupervised ML models for mutual fund pattern analysis during COVID pandemic.
- Used ML models for prediction and analysis of economic uncertainty during the Delta variant.

## Presentations

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Chitchat with AI: Understand the supply chain carbon disclosure of companies world-wide through Large Language Models. University of Massachusetts, Lowell, MA, Presentation.	Dec. 2025
Chitchat with AI: Understand the supply chain carbon disclosure of companies world-wide through Large Language Models. Informs, Atlanta, GA, Presentation.	Oct. 2025
To Bootstrap or Not: Evaluating the Impact on Propensity Score Matching Accuracy in Causal Inference. Quantitative and Risk Financial Symposium, Corfu, Greece, Presentation.	Jun. 2025
To Bootstrap or Not in Propensity Score Matching? Implications for Causal Inference in Economic Modelling. Babson Research Day, Wellesley, MA, Presentation.	Jan. 2025
Learning Fixed Points in RNNs through re-parameterization. Babson Research Day, Wellesley MA, Poster.	Feb. 2024
Learning Fixed Points in Recurrent Neural Networks. INFORMS Annual Meeting, Phoenix, AZ, Poster.	Oct. 2023
The Effects of Extreme Precipitation on Vegetation Variability in Kenya. Climatedatch Academy, Remote.	Jul. 2023
Decoding Stimulus Category from Single-trial Neural Activity. Neuromatch Academy, Remote, Slides.	Jul. 2022
Sleeping Analysis in UK Bio-bank data. Bayer Data Analytical and Statistical Meeting, Remote, YouTube Link.	Aug. 2021
The Relationship of Extracellular Fields – Neural Oscillations and Spikes. Neuromatch Academy, Remote, Slides.	Jul. 2021
Nonlinear Stimulus Representation in Semi-balanced Networks and Learning. Neuromatch Conference, Remote, YouTube Link (1:32:21–1:50:58).	Oct. 2020
Nonlinear Stimulus Representations in Neural Circuits with Approximate Excitatory-Inhibitory Balance. Society for Neuroscience (SfN) Meeting, Chicago, IL, Poster.	Oct. 2019
Rainbow Configuration. Nebraska Conference for Undergraduate Women in Mathematics (NCUWM), Lincoln, NE, Slides.	Feb. 2018
Frame Geometry. Missouri State University, Springfield, MO.	Jul. 2017
Mixing Time of the Generalized Rook’s Walk. Northern California Undergraduate Conference, Sonoma, CA, Poster.	Mar. 2017
A Generalized Framework for Studying Finite Rainbow Configuration. NCUWM, Lincoln, NE.	Feb. 2017
Mixing Time of the Generalized Rook’s Walk. Northern California Undergraduate Conference, Atlanta, GA, Presentation.	Jan. 2017
Prediction of Oscar Best Picture Award. Miller Scholar Meeting, Berkeley, CA.	Aug. 2016

## Competitions & Awards

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- Babson Faculty Research Fund, Babson College, MA Jan. 2026
- Babson Teaching Innovation Award, Babson College, MA Jul. 2025
- Babson Faculty Research Fund, Babson College, MA Jun. 2025
- Babson Faculty Research Fund, Babson College, MA Jun. 2024
- Arthur J. Schmitt Leadership Fellowship in Science and Engineering, University of Notre Dame, IN 2018 – 2023
- Kaggle Data Competition: Crossroads Analytic Challenges (Rank: Semi-final, 4th place), YouTube Link Winter 2021
- Domination of Midwestern Association of Graduate Schools: Excellence in Teaching Awards, YouTube Link 2020 – 2021
- ACMS Professional Development Award, University of Notre Dame, IN Spring 2020; Summer 2021; 2022
- Schmitt Travel Grant Award, University of Notre Dame, IN Spring 2020
- Striving for Excellence in College and University Teaching Certificate, University of Notre Dame, IN Spring 2020
- Benjamin A. Gilman International Scholarship for Traveling, U.S. Department of State Spring 2018
- Carroll Grants, Berkeley Educational Opportunity Program, CA Spring 2017; 2018
- AMS Undergraduate Travel Award, Joint Mathematics Meetings (Atlanta, GA) Fall 2017
- NSF Grant DMS 1559911 Award for REU, Missouri State University, Springfield, MO Summer 2017
- Academic Opportunity Fund Award, Berkeley ASUC Academic Affairs (NCUWM travel), CA Fall 2016 & 2017
- NSF Grant DMS 1460982 Award for REU, Willamette University, Salem, OR Summer 2016
- George A. Miller Scholarship for Undergraduate Research, UC Berkeley, CA 2015 – 2017
- The Collin Lai and Susan Hum Merit Scholarship for Academic Excellence, Los Angeles County Office, CA Fall 2016
- Robert Westerbeck Scholarship, Pasadena City College, CA Fall 2015
- Hixon Teacher Preparation Scholarship, Pasadena City College, CA 2015 – 2016
- Pacific Asian American Scholarship for Perseverance, Pasadena City College, CA Spring 2015

## Leadership & Volunteer Activities

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**Robotic Artificial Intelligence Tour, Cambridge, MA** Nov. 2025

- Organizer

- Took students from the Babson Honors Program and the Deep Learning in Business course to learn about some AI products, the Robotics.

**Posse Retreat, Greenfield, NH**

Feb. 2025

- Faculty Attendee
- Invited by the Posse students to represent the faculty to engage in a weekend of connection, resilience, and joy activities.

**World Habitat Day Service, Charlotte, NC**

Aug. 2023

- Designer & painter
- Drew the city skyline and painted with rainbow colors in large outdoor planters; design promotes affordable and decent homes and inclusion.

**Pi Day 5k Marathon, Notre Dame, IN**

2019 – 2022

- Outreach & race route organizer
- Organized the race route and ensured participant safety.

**Schmitt Society Concession Stand, Notre Dame, IN**

2019 – 2021

- Fund raising committee
- Raised \$2,500 in 2019 and \$3,000 in 2021 for Boys and Girls Club.

**AWIS-ND Mentorship Program, Notre Dame, IN**

2018 – 2019

- Mentor
- Mentored two undergraduate women each semester; organized workshops on LinkedIn networks and CVs.

**Cal Day, Berkeley, CA**

Apr. 2017

- Orientation coordinator
- Oriented incoming students and encouraged opportunities for underrepresented groups in STEM.

**Upward Bound, Monterey Park, CA**

2014 – 2015

- English phonics instructor
- Taught new immigrants basic English via phonetics.

**Sunrise Foundation, San Gabriel, CA**

2013 – Present

- Voiceover and translator
- Translated English to Chinese and hosted cultural events for the local community.

## Technical Skills

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- Proficient: Python, R, Matlab,  $\text{\LaTeX}$ , SQL, Excel, JMP, Azure, HTML
- Experienced: Dash, Tableau, Mathematica, Photoshop, Illustrator, Inkscape
- Languages: English, Mandarin

## Professional Memberships

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- INFORMS 2022 – Present
  - Faculty member
- Association for Women in Science 2018 – 2023
  - Professional Development Committee
  - ACMS Department Representative
  - Undergraduate Mentor
- Schmitt Leadership Society 2018 – 2022
  - Vice President
  - Website Designer & Developer