

# Cody Carroll

## Curriculum Vitae

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### Education

- 2021 **PhD in Statistics**, *University of California, Davis*  
Dissertation Title: Intercomponent Time Dynamics for Multivariate Functional Data
- 2017 **MS in Statistics**, *University of California, Davis*
- 2014 **BS in Mathematics**, *University of Texas at Austin*

### Academic Appointments

- 2022 - present **Assistant Professor**, *Department of Mathematics and Statistics / Master's in Data Science Program, University of San Francisco*
- 2022 **Lecturer**, *Department of Statistics, University of California, Davis*

### Professional Experience

- 2021 - 2022 **Data Scientist**, *Wells Fargo*, Charlotte, NC.

### Research Interests

**Functional and longitudinal data analysis**— time dynamics of multivariate functional data; constrained functional data analysis; analysis of random objects; longitudinal studies; growth and development

**Citizen science and California wildlife**— bird migration; bear encounters; conservation technology

**Deep learning and computer vision**— mitochondria segmentation; glaucoma diagnosis prediction; multimodal modeling

### Teaching

#### University of San Francisco

- Fall '23 Linear Regression  
Intro to Data Science with R

- Spring '23 Linear Algebra for Data Science  
Advanced Machine Learning

- Fall '22 Machine Learning Laboratory  
Communications for Analytics

#### University of California, Davis

- Spring '22 Applied Statistics for Business and Economics
- Summer '19 Brief Course in Mathematical Statistics II
- Spring '19 Applied Statistics for Biological Sciences
- Summer '18 Applied Statistics for Business and Economics

## Mentorship

- 2022-2023 Data Science Practicum, *Data Institute, USF*  
Advising Master's Practicums and Research
- Devendra Govil and Vichitra Kumar, *Dept. of Ophthalmology, Stanford University, with Sophia Ying Wang*
  - Xinyi Jessica Wang and Wan-Chun Elena Liao, *The Nature Conservancy, with Kirk Klausmeyer*
  - Mohana Medisetty and Yu-Hsin Wang, *Salk Institute for Biological Studies, with Uri Manor*
  - Xin Ai and Sharon Dodda, *CA Dept. of Fisheries and Wildlife, with Alex Heeren and Brett Furnas*
- 2017-2020 NSF Research Training Group, *Dept. of Statistics, UC Davis*  
Advising Undergraduate Research
- *Warping methods for wearable device data*, with Hainiu Xu
  - *Functional regression for wearable device data*, with Phoebe Biying Li
  - *Functional clustering for wearable device data*, with Weiyi Chen
  - *Geographic trends for functional housing price data*, with Yunbai Zhang
  - *Functional data analysis of global temperature extrema*, with Cynthia Lai
- 2020 Mentor for Undergraduate Honors Thesis  
*Warping methods for wearable device data*, by Hainiu Xu

## International Experience

- 2014-2015 ESL Teacher, *Nishinomiya Imazu Senior High School*, Nishinomiya, Japan

## Publications, Preprints, and other Creative Works

### Theory and Methodology

- 2023 *Latent Deformation Models for Multivariate Functional Data and Time Warping Separability*  
**C. Carroll** and H.-G. Müller. *Biometrics* 2023.
- 2022 *Learning Delay Dynamics for Multivariate Stochastic Processes, With Application to Predicting COVID-19 Case Trajectories in the United States*  
P. Dubey, Y. Chen, A. Gajardo, S. Bhattacharjee, **C. Carroll**, H. Chen, Y. Zhou, H.-G. Müller. *Journal of Mathematical Analysis and Applications*, 2022.
- 2020 *Cross-component Registration for Multivariate Functional Data, with Application to Growth Curves*  
**C. Carroll**, H.-G. Müller, A. Kneip, *Biometrics* 2020.

### Interdisciplinary Applications

- 2022 *Comparison of Diagnostic Predictors of Neonatal Survivability in Non-Domestic Caprinae*  
T. N. Bliss, M. J. Marinkovich, R. E. Burns, **C. Carroll**, M. M. Clancy, L. L. Howard. *Journal of Zoo and Wildlife Medicine*, 2022.
- 2021 *A Practical Method to Quantify Knowledge-Based Dose Volume Histogram Prediction Accuracy and Uncertainty with Reference Cohorts*  
B. Covele, **C. Carroll**, K. Moore, *Journal of Applied Clinical Medical Physics*, 2022.
- 2020 *Time Dynamics of COVID-19*  
**C. Carroll**, S. Bhattacharjee, Y. Chen, P. Dubey, J. Fan, A. Gajardo, X. Zhou, H.-G. Müller, J.-L. Wang, *Scientific Reports* 2020.

- 2020 *Mountaineers on Mount Everest: effects of age, sex, experience, and crowding on rates of success and death*  
 R. B. Huey\*, **C. Carroll**\*, R. Salisbury, J.-L. Wang, *PLoS One* 2020.

\* indicates co-first authorship

### **Podcasts and Media**

- 2022 - present *Data Science Beginnings*, with Robert Clements.  
 - Season 1 (6 episodes)  
 - Season 2 (ongoing)

### **Software**

- Contributor/ *fdapace: Functional Data Analysis and Empirical Dynamics. R package.*  
 Former **C. Carroll**, A. Gajardo, Y. Chen, X. Dai, J. Fan, P. Z. Hadjipantelis, K. Han, et al.  
 Maintainer <https://CRAN.R-project.org/package=fdapace>.

### **Ongoing Projects and Whitepapers**

- 2023+ *Seasonality Patterns of Northern Californian Birds through Citizen Science and Functional Data Analysis*  
**C. Carroll** and D. Govil.  
 2023+ *An Automated Workflow for Satellite-based Monitoring of Field Flooding*  
 X. Wang, W.-C. Liao, **C. Carroll**.  
 2023+ *Multimodal Deep Learning Models for Glaucoma Progression*  
 D. Govil, V. Kumar, S. Y. Wang, **C. Carroll**.

## **Presentations**

### **Invited Talks**

- 2023 Math Colloquium, *USF*  
*Time Warping and Functional Data*  
 2022 Department of Mathematics and Computer Science, *Cal Poly Humboldt*  
*Mixed-Effect Warping Models for Multivariate Human Growth Curves*  
 2022 Department of Mathematics and Computer Science, *Cal Poly Humboldt*  
*Case Study in Data Science Pedagogy: k-Nearest Neighbors Regression*  
 2022 Halicioğlu Data Science Institute, *UC San Diego*  
*Latent Transport Models for Multivariate Functional Data*  
 2022 Halicioğlu Data Science Institute, *UC San Diego*  
*Case Study in Data Science Pedagogy: k-Nearest Neighbors Regression*  
 2022 Department of Mathematics and Statistics, *San Diego State University*  
*Intercomponent Time Dynamics for Multivariate Functional Data*  
 2022 Department of Mathematics and Statistics, *USF*  
*Nonparametric Regression on Mt. Everest*  
 2022 Data Institute, *USF*  
*Intercomponent Time Dynamics for Multivariate Functional Data*  
 2022 Department of Probability and Applied Statistics, *UC Santa Barbara*  
*Teaching Statistics Here and Now*  
 2022 Department of Statistics, *UC Berkeley*  
*Case Study in Data Science Pedagogy: Linear Association and Correlation*  
 2021 Department of Applied Statistics, *Lawrence Livermore National Lab*  
*Latent Transport Models for Multivariate Functional Data*

- 2020 ECHO Lab, *Bill and Melinda Gates Foundation*  
*Longitudinal Data Analysis with fdapace*
- 2020 Department of Statistics, *UC Davis*  
*Shift-Warping for Multivariate Functional Data*
- 2019 NSF RTG Statistics Workshop Series, *UC Davis*  
*Deception and Coin Flips: Statistical Intuition through Lies and Games*
- 2018 NSF RTG Symposium: Modern Tools for Statistics, *UC Davis*  
*A Practical Introduction to Functional Data Analysis*
- 2018 Department of Statistics, *UC Davis*  
*Time Warping for Human Growth Curves*

### **Posters**

- 2023 *An Automated Workflow for Satellite-based Monitoring of Field Flooding, Creative Activity and Research Day 2023, USF.*
- 2020 *Benchmarking Dose-Volume Histogram Prediction Accuracy Between Different Knowledge-Based Models, Vancouver, BC, Canada, Joint AAPM/COMP Meeting*

## **Professional Service**

### **University and Departmental**

- Hiring committee member for the Assistant Director of the Data Institute search
- Major/Minor Fair representative for Math dept.
- AWM Integration Bee judge
- Machine learning consultant for the open-source KNIME platform
- Interviewed new MSDS faculty.
- Interviewed prospective MSDS students (50+ candidates).
- Organized and hosted weekly Job Hunt Seminar for MSDS advisees.

### **Editorial Review**

- Annals of Statistics
- Journal of the American Statistical Association
- Biometrika
- Computational Statistics and Data Analysis
- Multivariate Behavioral Research
- Computer Methods and Programs in Biomedicine
- Statistics in Medicine

## **Awards and Fellowships**

- 2023 Travel Award for Joint Statistical Meetings  
*Faculty Development Fund, USF*
- 2022 Functional Data for Citizen Science  
*Faculty Development Fund, USF*
- 2021 Peter Hall Graduate Research Award  
*Dept. of Statistics, UC Davis*
- 2021 Alan Fenech Service Award  
*Dept. of Statistics, UC Davis*

- 2020 Outstanding Graduate Teaching Award  
*Dept. of Statistics, UC Davis*
- 2020 Excellence in Teaching Award  
*Dept. of Statistics, UC Davis*
- 2015-2020 NSF Research Training Grant Recipient  
*UC Davis*
- 2016-2019 Summer Statistics Research Fellowship Award  
*Dept. of Statistics, UC Davis*
- 2015-2018 UC Davis Graduate Scholars Fellowship  
*Grad. Studies, UC Davis*

## Languages

R, Python, git, SQL, Julia,  $\text{\LaTeX}$