

Christian O. Bernal Zelaya

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EDUCATION

EXPECTED PERIOD	September 2023 — 2028	
EXPECTED DEGREE	Doctor of Philosophy (Ph.D.) in Statistics	
CURRENT GPA	3.925	
UNIVERSITY	University of California, Irvine	California, USA
EXPECTED PERIOD	September 2023 — June 2025	
EXPECTED DEGREE	Masters of Science (M.S.) in Statistics	
CURRENT GPA	3.925	
UNIVERSITY	University of California, Irvine	California, USA
PERIOD	August 2019 — May 2023	
DEGREE	Bachelor of Science (B.S.) in Mathematics	
CONCENTRATION	Applied Mathematics	
CONCENTRATION	Statistics	
MINOR	Computer Science	
GPA	3.42	
UNIVERSITY	California State University, Bakersfield	California, USA

RESEARCH PROJECTS

PERIOD	June 2024 — Present	
MENTOR	Dr. Dylan Morris & Dr. Kaitlyn Johnson	CDC's Center for Forecast & Outbreak Analytics
TITLE	Assessing the value of spatial components in a wastewater-informed epidemiological inference model	
	Expanding an existing wastewater-informed model that forecasts hospital admissions by adding spatial correlations. This was done to assess the value to including these spatial correlations that occurred at the wastewater treatment plant level. Model was made in R and STAN, with a software package associated with it, https://cdcgov.github.io/ww-inference-model/ . PYTHON exposure occurred on a regular basis. A manuscript is currently being prepared for submission.	
PERIOD	Aug 2023 — Present	
MENTOR	Dr. Volodymyr M. Minin	University of California, Irvine
TITLE	Forecasting and nowcasting health care demand by integrating hospitalization and wastewater surveillance data	
	Creating an ODE based Bayesian semiparametric model that forecasts hospitalizations caused by COVID-19, with the ability to nowcast. The model is informed by hospitalization data and wastewater surveillance data. The model is created in JULIA, with a software package associated with it called UCIWWEIHR, https://cbernalz.github.io/UCIWWEIHR.jl/dev/ . Various innovative strategies for selecting priors on specific parameters were employed. A manuscript is currently being prepared for submission, with this forming the first chapter of my dissertation.	
PERIOD	Aug 2023 — Sep 2023	
MENTOR	Dr. Volodymyr M. Minin	University of California, Irvine
TITLE	COVID-19 Probabalistic Forecast Model Evaluations	
	Investigating COVID-19 probabalistic forecasting models by visualizing evaluation metrics in several ways. Project is the foundations for a potential dissertation portion where one of the goals is to improve the probabalistic forecasting by adding a spatial component.	

PERIOD	March 2022 — Aug 2023	
MENTOR	Dr. Brian Ryals	California State University, Bakersfield
TITLE	Disease Modeling Using Complex Graphs	
This project involves using MATLAB to create a simulation of SIR model for diseases. Several attributes are saved from each simulation made, which led to several hundred thousand rows of data that was analyzed adequately. One major aspect of this study was to investigate different vaccination strategies. A manuscript was put together, but never submitted due to graduating from institution.		
PERIOD	Sep 2022 — Aug 2023	
MENTOR	Dr. Bilin Zeng	California State University, Bakersfield
TITLE	Statistical Analysis of Neuroimaging	
Working with a statistics professor to look at MRI data, specifically patients with Alzheimer and ADHD. The project is done using R-Studio.		
PERIOD	May 2022 — July 2022	
MENTOR	Dr. Sumona Mondal	Clarkson University
TITLE	Using Comorbidities, Demographic, and Socioeconomic Data to Predict Onset of Rheumatoid Arthritis	
This position was with Clarkson University's REU program. Involved researching and reading papers about Rheumatoid Arthritis, RA. With this information we figured out variables that might have some affect toward RA. These variables were visualized using R-Studio and then tested for significance. A seemingly new strategy for sampling a dataset was created during this project.		
PERIOD	March 2022 — May 2022	
MENTOR	Dr. Eduardo Montoya	California State University, Bakersfield
TITLE	Educational Research for Intro to Statistical Concepts Course	
This was an educational research project that involved looking through several journals and case studies for papers that had data pertaining to certain areas. This data would then be used in the creation of problems for an Intro to Statistical Concepts course.		
PERIOD	May 2020 — August 2021	
MENTOR	Dr. Prosper Torsu	California State University, Bakersfield
TITLE	An Iterative Method For Solving Elliptic BVP In One-Dimension	
This project involves a decomposition method for solving elliptic boundary value problems in one-dimension. Which is an improvement to an existing technique for approximating elliptic systems. The project initiated prior to the quarantine, so progress was slow, but eventually a paper was submitted to be published.		
PERIOD	June 2019 — July 2019	
MENTOR	Dr. Prosper Torsu	California State University, Bakersfield
TITLE	Reservoir Simulation and Optimization of Well Placement	
This project involved creating a simulation with MATLAB. The simulation was then used to find the best placement of oil extractors. This was then presented in a poster presentation.		

PUBLICATIONS/MANUSCRIPTS UNDER PREPARATION

PROJECTED SUBMISSION	March 2025	
TITLE	Forecasting and nowcasting health care demand by integrating hospitalization and wastewater surveillance data	
PROJECTED SUBMISSION	January 2025	
TITLE	Assessing the value of spatial components in a wastewater-informed epidemiological inference model	

PROJECTED SUBMISSION TITLE	January 2025 Bayesian generative modeling for heterogeneous wastewater data applied to COVID-19 forecasting	
COMPLETED ARCHIVED TITLE	August 2021 October 2024 An Iterative Method For Solving Elliptic BVP In One-Dimension	https://arxiv.org/abs/2410.06276

PRESENTATIONS

ORGANIZATION PRESENTATION TITLE	CDPH CalCAT Tutorial on UCIWWEIHR JULIA package.	California Department of Public Health
ORGANIZATION PRESENTATION TITLE	Department of Mathematics Seminar Assessing the value of spatial components in a wastewater-informed epidemiological inference model & Forecasting and nowcasting health care demand by integrating hospitalization and wastewater surveillance data	California State University, Bakersfield
ORGANIZATION PRESENTATION TITLE	Internship Capstone Presentation Assessing the value of spatial components in a wastewater-informed epidemiological inference model	CDC's Center for Forecasting & Outbreak Analytics
ORGANIZATION PRESENTATION TITLE	CDPH CalCAT Update Forecasting and nowcasting health care demand by integrating hospitalization and wastewater surveillance data	California Department of Public Health
ORGANIZATION PRESENTATION TITLE	Competitive Edge COVID-19 Probabalistic Forecast Models	University of California, Irvine
ORGANIZATION PRESENTATION TITLE	Student Poster Presentation Disease Modeling Using Complex Graphs	California State University, Bakersfield
ORGANIZATION PRESENTATION TITLE	Student Research Competition 2023 Disease Modeling Using Complex Graphs	California State University, Bakersfield
ORGANIZATION PRESENTATION TITLE	Department of Mathematics Seminar Disease Modeling Using Complex Graphs	California State University, Bakersfield
ORGANIZATION PRESENTATION TITLE	Department of Mathematics Seminar Data-Centric Approach to Rheumatoid Arthritis: Exploring Fatty Acid Contribution to Infection	California State University, Bakersfield
ORGANIZATION PRESENTATION TITLE	REU Presentation Data-Centric Approach to Rheumatoid Arthritis: Exploring Fatty Acid Contribution to Infection	Clarkson University
ORGANIZATION PRESENTATION TITLE	Senior Seminar Presentation of Kellner C. Bernd's paper Power-Sum Denominators	California State University, Bakersfield
ORGANIZATION PRESENTATION TITLE	Senior Seminar Critique of California State University, Bakersfield's General Education Curriculum	California State University, Bakersfield

ORGANIZATION	Senior Seminar	California State University, Bakersfield
Presentation		
Title	Lecture on Stochastic Process	
ORGANIZATION	Chevron Revs-Up Poster Presentation	California State University, Bakersfield
Presentation		
Title	Reservoir Simulation and Optimization of Well Placement	

TEACHING EXPERIENCE

PERIOD	September 2023 — Present	
EMPLOYER	University of California, Irvine	
JOB TITLE	Teaching Assistant	
PERIOD	January 2023 — August 2023	
EMPLOYER	Panama Buena Vista Union School District	
JOB TITLE	Substitute Teacher	
PERIOD	December 2022 — August 2023	
EMPLOYER	Paper Co.	
JOB TITLE	Science Tutor	
PERIOD	June 2023 — August 2023	
EMPLOYER	California State University, Bakersfield	
JOB TITLE	Summer Session Mathematics Tutor	
PERIOD	June 2022 — May 2023	
EMPLOYER	California State University, Bakersfield	
JOB TITLE	Facilitator/Course Instructor	
PERIOD	May 2022 — May 2023	
EMPLOYER	California State University, Bakersfield	
JOB TITLE	Lead Mathematics Tutor	
PERIOD	August 2019 — August 2022	
EMPLOYER	California State University, Bakersfield	
JOB TITLE	Mathematics Tutor	
PERIOD	August 2019 — December 2019, February 2022 — August 2022	
EMPLOYER	Kern High School District	
JOB TITLE	AVID Tutor	

PRIOR EMPLOYMENT

PERIOD	June 2024 — September 2024	
EMPLOYER	CDC's Center for Forecast and Outbreak Analytics	
JOB TITLE	Summer Data Scientist Internship	

AWARDS/SCHOLARSHIPS/ORGANIZATIONS PART OF/GRANTS

UC Irvine Department of Statistics Travel Award
 UC Irvine Department of Statistics Technology Award
 UC Irvine Diversity Recruitment Fellowship
 Outstanding Graduating Senior in Mathematics at California State University, Bakersfield
 Roadrunner Society at California State University, Bakersfield
 Student Research Scholars at California State University, Bakersfield
 Louis Stokes Alliances for Minority Participation (LSAMP)
 Kern Community Foundation Scholarship
 Pell Grant 1
 Cal B Grant
 Educational Opportunity Program (EOP)

EXTRACURRICULAR ACTIVITIES/WORKSHOPS

President of Mathematics Club at California State University, Bakersfield
Preliminary Arizona Winter School 2022: Heights and Model Theory

PROGRAMMING LANGUAGES

R		Python		C/C++
STAN		JULIA		JAGS

SOFTWARES USED

MATLAB		R-Studio		Latex		Jupyter Notebook
SAS		SPSS		Microsoft Office		Minitab