

# Kayla Bollinger

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## EDUCATION

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**Carnegie Mellon University** – Pittsburgh, PA

Ph.D., Applied Mathematics

May 2022

**California State University Long Beach** – Long Beach, CA

Post-Baccalaureate Coursework, Applied Mathematics

Aug 2015 – May 2017

B.S., Physics, *Summa Cum Laude*, *Robert D. Rhodes Award*

May 2015

## SKILLS

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**Technical Skills**

Python (pandas, NumPy, PyTorch, scikit-learn, Matplotlib, Plotly), Tableau, MS Excel, SQL

**Machine Learning Skills**

regression, regularization techniques, dimensionality reduction, neural networks

**Certifications & Training**

Google Data Analytics Professional Certificate (Coursera)

## RELEVANT WORK EXPERIENCE

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**CMU Department of Mathematical Sciences**

*Graduate Researcher*

Aug 2020 – May 2022

- Designed a regression/neural network based machine learning algorithm to learn a reduced order model whose interpretable structure led to a 20% decrease in error when compared to a standard neural network approach
- Experimentally demonstrated the robustness of this model in the data scarce setting (e.g., fewer than 100 data points) by comparing to a range of standard models; typically resulting in at least  $2\times$  smaller error than the next best approach
- Developed a Python package to implement this model utilizing a combination of original code and several Python libraries such as PyTorch, scikit-learn, and NumPy
- Communicated the methods and results of this work by publishing and presenting “Reduced Order Modeling Using Shallow ReLU Networks” at the 2021 Conference on Mathematical and Scientific Machine Learning

*Research Mentor*

Jun 2020 – Aug 2020

- Mentored 4 undergraduate research students for CMU’s “Summer Experiences in Mathematical Sciences” through weekly check-in meetings to resolve any problems and to advise them on possible next steps
- Guided students in the task of modeling dynamical systems using neural networks by analyzing code, discussing best practices for training and testing machine learning models, and offering advice on how to clearly present results

*Teaching Assistant for “Numerical Analysis”*

Aug 2021 – Dec 2021, Aug 2020 – Dec 2020

- Led weekly computer lab sessions for ~40 students to facilitate their ability to apply theory from lecture to real world examples; received an average score of 4.73/5.00 for overall teaching effectiveness as evaluated by the students (compared to the 4.28 departmental average)
- Created 21 Jupyter Notebook based lessons which demonstrated how to use Python libraries such as NumPy and Matplotlib to effectively analyze and visualize data in clear and meaningful ways

## PROJECT EXPERIENCE

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**Google Data Analytics Capstone Project**

Nov 2022

- Cleaned and analyzed a year’s worth of bike-share data (approximately 5.7 million data points) using the pandas Python library and documented the process within a Jupyter Notebook
- Determined meaningful differences between casual and member users of the bike-share program and delivered recommendations on how a marketing team may best influence casual users to become members
- Designed an interactive dashboard in Tableau for to effectively support and share the results of the analysis