CURRICULUM VITAE

W. Zane Billings

Contact Information:

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Education:

2020 B.S., Biology and Mathematics, Western Carolina University. 4.0 GPA.

Research:

PI: Heather Coan, Western Carolina University. Spring 2016 – Present

Contact: hacoan@email.wcu.edu

- Examined the ability of keratin to modulate the autophagy pathway in human cells.
- Maintained HEK-293 cultures for the lab group, and prepared cultures for experiments.
- Optimized transfection into HEK cells of a dual-reporter autophagy biomarker plasmid.
- Visualized changes in the autophagy pathway using wide-field epifluorescence microscopy.
- Compiled and analyzed data using FIJI and `R`.

PI: Andrew Penland, Western Carolina University. Fall 2019 – Present

Contact: adpenland@email.wcu.edu

- Simulated results from an Armitage-Doll carcinogenesis model on a large scale.
- Graphically displayed results from large simulations.
- Instructed research group members in using `R` and the tidyverse suite.
- Helped solve problems related to probability distributions on hypergraphs.

PI: Jeff Lawson, Western Carolina University. Fall 2019 – Present

Contact: jlawson@email.wcu.edu

- Analyzed least squares models for logistic growth ODE parameter recovery from time series data.
- Developed a suite of functions for replicable time series data generation and least squares fitting in `R`.

PI: Andreas Handel, University of Georgia. Summer 2019

Contact: ahandel@uga.edu

Website: https://www.andreashandel.com/

- Participant in the 2019 REU site Population Biology of Infectious Diseases at the University of Georgia, and was funded by the NIH.
- Cleaned and joined a complex relational data set from a 2016–2017 study at the University of Georgia student health center.

- Analyzed the impact of viral load estimates from qPCR data on clinical prognoses and treatment of influenza A.
- Modeled and visualized the relationships between several variables using `R`, and presented results using `R`-Markdown.

PI: Louis-Marie Bobay, UNC Greensboro. Summer 2018

Contact: ljbobay@uncg.edu

- Participant in the 2018 REU site Math-Biology at the University of North Carolina at Greensboro, and was funded by the NSF.
- Constructed a probabilistic model for determining the probability of n number of convergent mutations between two bacterial genomes.
- Verified the accuracy of the model using Monte-Carlo simulation methods in `Python`.
- Visualized model predictions, effects of parameters, and simulation results in `R`.
- I also worked extensively with Dr. Johnathan Rowell (contact: jtrowell@uncg.edu) on the same project.

OEIS (On-line Encyclopedia of Integer Sequences) Contributions

All of these sequences can be viewed at `https://oeis.org`.

- Author of sequence A319302.
- Author of sequence A309092.
- Wrote Python code and generated a b-file for sequence A110529.

Experience:

Lab assistant Spring 2019 - Present

I am the "lab assistant" for MATH 340: Introduction to Scientific Computing at WCU.

- Teach LaTeX(), Excel, Mathematica, `MATLAB`, and `R` to students from diverse majors, including mathematics, computer science, engineering, biology, and chemistry.
- Develop hands-on activities for students to complete in and out of class to either facilitate understanding of course topics, or explore applications.
- Assist students in debugging code during hands-on class time.

Course tutor Spring 2017 - Spring 2019

- Tutored several courses at WCU's student tutoring center, including introductory biology, organic chemistry, genetics, evolutionary biology, immunology, and microscopy.
- Worked one-on-one with students to reinforce course content, including working with non-traditional students.
- Adapted course information to the invidual learning styles of a diverse client body.
- Led group tutoring and review sessions where I was responsible for assisting several students at once with course material.

Awards:

- Meritorious Winner, COMAP Mathematical Contest in Modeling, 2019.
- WCU Distinguished Achivement Scholarship, 2016 – 2020.

- Stacy O'Connell Scholarship and research grant, 2018–19 and 2019–2020.
- Chancellor's List, every semester.

Coursework:

- Biology: Advanced Techniques in Microscopy, Cell Biology, Evolutionary Biology, General Ecology, Molecular Immunology, Origin of Species, Protein Systems Bioinformatics, Fermentation Methods, Biostatistics.
- Math: Linear Algebra, Linear Optimization, Mathematical Modeling, Ordinary Differential Equations, Probability Theory, Scientific Computing, Linear Regression, Intro to Time Series, Numerical Analysis, Mathematical Statistics, Complex Variables.

Skills:

- Responsible Conduct in Research (RCR) certified (CITI Program).
- CRLA certified Level 1 Tutor.
- Programming languages: `R`, Python, `MATLAB` (Learning C and Ruby!).
- Programming tools: Git and Github, Bash terminal.
- Software: Mathematica, Tableau, NetLogo, FIJI (ImageJ).
- Presentation: Familiar with LaTeX, Markdown (and R-Markdown), HTML, and CSS.
- Molecular Biology: Mammalian cell culture and fluorescence microscopy.