Curriculum Vitae

W. Zane Billings

Contact Information

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Education

Western Carolina University **Cullowhee, NC**
Mathematics and Biology, B.S., 4.0 GPA *2016–2020*

- Concentrations: Applied mathematics, molecular biology
- Minor: Chemistry

Honors and Awards:

- Chancellor's List, every semester
- WCU Distinguished Achievement Scholarship (2016 - 2020)
- Several other scholarship awards from Biology, Mathematics, and the Honors College.
- Math and Computer Science Department Ambassador, Fall 2018 onward
- COMAP Mathematical Contest in Modeling 2019: Meritorious Winnter (Problem A)

Employment

Coan Lab at Western Carolina University **Cullowhee, NC**
Lab manager, researcher *Fall 2018–Present*

- Supervised by Dr. Heather Coan at WCU.
- Researched the autophagy pathway, focused on stress-induced autophagy in human cells.
- Utilized several techniques from mammalian cell culture and fluorescence microscopy.
- Ensured the lab environment, including the cell culture facility, was tidy and complied with BSL-2 and OSHA saftey standards.
- Prepped cell cultures and solutions for other lab workers and assisted with use of lab technology such as the fluorescence microscope and culture room.
- Worked with the Advanced Techniques in Microscopy Laboratory, mainly assisting with data analysis protocols.

Mathematics and Computer Science Department, WCU **Cullowhee NC**
Mathematics lab assistant *Spring 2019 – present*

- Worked as a lab assistant for the hands-on, programming based course MATH 340: Introduction to Scientific Computing. This course is designed as a first introduction to programming and scientific computing, and is primarily taken by math, computer science, and engineering students.
- Assisted several students with LaTeX, MATLAB, R, and Mathematica coding, as well as Excel spreadsheet development.
- Developed educational activities to strengthen coding skills for in-class use.

Population Biology of Infectious Diseases REU **Athens, GA**
Researcher; REU participant, Handel Research Group *Summer 2019*

- Participated in the 2019 Summer NSF-funded REU program at the University of Georgia, Athens.
- Wrote R code to perform a variety of tasks, including cleaning and joining data, summarizing and visualizing data, and constructing models.
- Analyzed cross-sectional data from a study performed at UGA's Student Health Clinic, in order to analyze the clinical revelance of qPCR data to influenza prognosis and care.
- Communicated results of data analysis through markdown, intermediate progress presentations, and a final poster presentation.
- Worked with Dr. Handel to prepare walkthroughs and solutions to several learning modules for the DSAIDE R package.

Math-Bio REU at the University of North Carolina, Greensboro **Greensboro, NC**
Researcher; REU participant, Bobay Research Group *Summer 2018*

- Utilized methods from genomics to analyze large DNA sequence datasets.
- Visualized data for the project using R.
- Contributed to mathematical models of convergent mutations between DNA strands.
- Assisted in the design of Python simulations to verify findings.

Writing and Learning Commons at WCU **Cullowhee, NC**
Course Tutor *Spring 2017–Spring 2019*

- Tutored peers in material from introductory biology, organic chemistry and genetics. As of Spring 2019, I am tutoring Immunology, Advanced Techniques in Microscopy, and Evolutionary Biology.
- Identified strategies for working with students who had different learning techniques.
- Communicated with professors regarding material students did and did not know, and questions which came up commonly during tutoring.

New River Engineering, PLLC **Mount Holly, NC**
Proofreader *July 2014– August 2016*
I proofread emails, project proposals, and technical reports to provide grammatical and stylistic corrections.

Research Experience

Cell Biology **Western Carolina University**
Mentor: Heather Coan *Spring 2016–Present*
I conducted independent research on autophagic flux. My research utilized several tools from molecular biology and microscopy in order to elucidate stress-induced autophagic flux in human cells. I maintained bacterial cultures and extracted plasmids, maintained human cell cultures, transfected plasmids into human cells, and stressed cells before visualization using widefield fluoresence microscopy. After visualization, I was involved in image processing and designed analyses for the data.

Epidemiology and Biostatistics **University of Georgia, Athens**
Mentor: Andreas Handel *Summer 2019*
As part of the Population Biology of Infectious Diseases REU, funded by the NSF and NIH, I worked with the Handel research group. My research included the development of software packages in the R language for epidemiology education, and analysis of flu data collected at the UGA student health center.

Computational Biology **University of North Carolina, Greensboro**
Mentor: Louis-Marie Bobay *Summer 2018*
As part of the Math-Biology REU site, I worked on a team modeling the rate of convergent mutation between bacterial genomes. In order to predict rates of homologous recombination, we constructed a probabilistic model of recombination and designed and ran several simulations to verify.

Organic Chemistry **Western Carolina University**
Mentor: William Kwochka *Fall 2017–Spring 2018*
I conducted independent research in organic chemistry. The lab group's work focused on characterizing the nature of the "dative bond" between Lewis acid-base complexes. I synthesized several derivatives of an organic boron-containing compound and complexed several of these bonds. Additionally, I characterized these compounds using spectroscopic methods.

Behavioral Ecology **Western Carolina University**
Mentor: Jeremy Hyman *Summer 2016*
As part of a two-week program (SURP) prior to my first semester at WCU, I assisted Dr. Hyman and a senior undergraduate student with her thesis work on the behavior of song sparrows. I mainly participated in the field component of the research, assisting with bird song playback experiments as well as catching a bird.

Skills

Lab techniques: Aseptic technique, mammalian cell culture and transfection, fluorescence microscopy, PCR, ELISA, Western blot, CITI Program responsible conduct in research certification.

Programming: Proficient with R (including Base and Tidyverse), LaTeX, and Markdown, intermediate proficiency with Python, familiar with Git and CSS.

Relevant Coursework

Biology: Immunology, Advanced Techniques in Microscopy, Protein Systems and Bioinformatics, Cell Biology, Evolutionary Biology, Origin of Species

Mathematics: Differential Equations, Linear Algebra, Statistical Methods (I–Intro & II–Time Series and Linear Regression), Scientific Computing, Linear Optimization, Introductory Probability Theory, Mathematical Modeling