ELLIE RAHM KIM

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RESEARCH INTERESTS

My research interest focuses on integrating computing/engineering methodologies to solve problems in biomedical sciences. I am driven to contribute to the advancement of precision medicine in cancer through the development of novel computational tools that unravel the complexities of the cancer genome.

EDUCATION

The University of Texas at Austin **GPA:** 3.97 | 2025

B.S. in Neuroscience, B.A. in Government

- Minor in Computer Science
- Minor in Computational Engineering
- Minor in Scientific Computation and Data Sciences
- Minor in Applied Statistical Modeling
- Minor in Philosophy of Law
- Minor in Social and Behavioral Sciences

Relevant Coursework: Genetics, Neural Computation, Quantitative Neuroscience, Programming, Software Design, Scientific Computing, Data Science, Multivariable Calculus, Differential Equations, Linear Algebra, Probability, Statistics

RESEARCH EXPERIENCE

Harvard Medical School (Beroukhim Lab) Summer 2024
Summer Research Trainee

Dell Medical School of The University of Texas at Austin (Yi Lab) 2024 - Present
Research Assistant

- Employ single-cell RNA sequencing data to detect somatic mutations in tumor samples
- Independently create genomic data processing pipeline that includes mapping, indexing, and variant calling
- Investigate patterns of tumor evolution and metastasis through phylogenetic tree construction

The University of Texas at Austin (Mauk Lab) 2022 - 2023
Research Assistant

- Conducted research on neural computation using a conductance-based spiking network model
- Managed a project analyzing the efficacy of synaptic plasticity models for network performance
- Led a comparative project on cerebellar cell learning rates in a computational simulation
- Developed Python scripts to visualize neuron spike activity in raster plots and PSTHs

MD Anderson Cancer Center (Akdemir Lab) Summer 2023
Summer Research Trainee

- Utilized computational tools to analyze 3D chromatin conformation data from tumor samples
- Developed an algorithm to detect recurrent cancer genes from chromatin loop dataset
- Investigated a hypothesis on whether 3D chromosomal rearrangements alter gene expression levels
- Applied diverse statistical methods to effectively address research questions
- Proficiently handled large-scale genomic data on cluster computing environment
- Actively contributed to lab activities through journal club presentations and mentoring

Dell Medical School of The University of Texas at Austin (Dunsmoor Lab) 2022
Research Assistant

- Conducted MRI scans on patients with PTSD while adhering to established safety protocols
- Analyzed data through efficient cleaning and manipulation using Python's pandas and NumPy libraries

The University of Texas at Austin (Mrazek Lab) 2021 - 2022
Research Assistant
- Developed a web scraping technique to prospect potential clients
- Designed a data collection strategy that leveraged a federal freedom of information law
- Created visualizations using Python scripts to effectively present findings and insights
- Presented a comprehensive overview of web scraping and HTML parsing

MD Anderson Cancer Center (Akdemir Lab) Summer 2022
Summer Research Trainee
- Developed genomic analysis scripts to study mutational patterns in cancer
- Built an efficient pipeline for identifying significant variants in genome sequencing data
- Leveraged advanced computational tools to visualize and quantify tumor progression
- Utilized public genomic databases to accurately detect and compare mutations in tumor samples

INDEPENDENT PROJECTS

Cell Differentiation Modeling 2023
"Investigating Cell Differentiation in the Brain with a Computational Model of Delta-Notch Signaling and Dynamical System Analysis"
- Conducted extensive literature review to inform the development of the computational model
- Developed a Python-based mathematical model to simulate neural development process over time
- Designed an algorithm inspired by the random walk process to generate a cell network that simulates the interactions between neighboring embryonic stem cells in the brain

Patient Genome Analysis 2023
"Comparative Analysis of Single Nucleotide Polymorphism (SNP) Genomic Data in Patients with Anxiety Disorder (AD) and Major Depressive Disorder (MDD)"
- Acquired genomic data from publicly available sources and curated the datasets for analysis
- Conducted exploratory data analysis using dplyr, tidyr, and ggplot packages in R
- Analyzed differences in single nucleotide mutation profiles between patients with AD and MDD
- Created visualizations with ggplot to answer research questions

Neural Activity Simulation Study 2022
"Simulation Analysis of Neuron Firing Activity in Cerebellar Cells for Learning and Extinction Evaluation"
- Performed in-depth analysis of neuron firing activity to investigate learning and extinction rates
- Employed statistical analysis techniques to confirm the accuracy and reliability of the outcomes
- Delivered a presentation on results to classmates and lab members

TEACHING EXPERIENCE

Peer STEM Tutor 2024 - Present
College of Natural Sciences, The University of Texas at Austin
- Provide clear, digestible guidance that simplifies complex concepts in Biology, Chemistry, and Neuroscience for struggling students

Teaching Assistant 2023 - Present
Genetics (BIO 325), The University of Texas at Austin
- Design lesson plans and led weekly discussion sessions for 30+ students
- Experiment with various teaching strategies to identify effective approaches, ensuring classes are both comprehensible and engaging
- Organize and share easy-to-understand figures and summarized resources to aid the learning process

- Provide additional after-hours support during office hours and exam review sessions
- Manage course-related responsibilities, including grading and attending lectures

Teaching Assistant 2023
Neural Systems III: Quantitative Tools (NEU 340), The University of Texas at Austin
- Provided tailored support for students learning coding for scientific research purposes
- Effectively managed administrative tasks alongside a substantial grading workload

Private Tutor 2019 - 2020
Self-Employed
- Personalized lesson plans targeted at individual students' challenges in High School Mathematics

Academic Instructor 2019
Patrick Language Institute
- Instructed 50+ students in preparing for the Test of English as a Foreign Language (TOEFL)
- Proofread essays and improved students' scores by up to 50% in writing section of test

WORK EXPERIENCE

College Readiness Mentor Summer 2024
College of Natural Sciences, The University of Texas at Austin
- Oversaw communication and mentorship for 300+ freshmen, delivering support through email updates and individual guidance
- Conducted orientation and tutoring sessions in Calculus and Chemistry to enhance student academic readiness

Customer Service Associate 2021 - 2022
International Student and Scholar Services, The University of Texas at Austin
- Managed and addressed inquiries from prospective and current international students
- Implemented proactive approaches to resolve complex immigration-related issues for students
- Provided administrative support to 30+ office personnel, ensuring efficient workflow

VOLUNTEER WORK

Advising Fellow 2023 - Present
Matriculate
- Lead ongoing mentorship and advising sessions for high school students from underprivileged backgrounds, guiding them through the college admissions process
- Engage in thorough training, workshops, and skill evaluations to enhance advising proficiency

Neuroscience First-Year Interest Group Mentor 2024
Department of Neuroscience, The University of Texas at Austin
- Facilitated mentorship events for first-year Neuroscience majors, providing extensive support in navigating college life, exploring research opportunities, and professional development

International Orientation Advisor 2022 - 2023
International Student and Scholar Services, The University of Texas at Austin
- Served as a mentor and student panelist at the orientation for incoming international students
- Delivered engaging virtual information sessions, presenting insights on student life and answering questions from a 300+ audience

PRESENTATIONS

"Structural Disruptions of the 3D Genome Architecture in Human Brain Cancer"

- APR 2024 Technology & Science Undergraduate Research Forum, The University of Texas at Austin
- APR 2024 Longhorn Research Poster Session, The University of Texas at Austin
- SEP 2023 Fall Undergraduate Research Symposium, The University of Texas at Austin
- AUG 2023 Summer Research Poster Competition, MD Anderson Cancer Center

"Computational Investigation of Single Nucleotide Driver Mutations and Tumor Evolution Using Chromatin Conformation Data"

- APR 2023 College of Natural Sciences Undergraduate Research Forum, The University of Texas at Austin
- APR 2023 Longhorn Research Poster Session, The University of Texas at Austin

HONORS & AWARDS

Dean's Honor List, College of Liberal Arts, The University of Texas at Austin
Fall 2022 (Summa Cum Laude), Spring 2023 (Summa Cum Laude), Fall 2023 (Magna Cum Laude)

University Honors, The University of Texas at Austin
Fall 2021, Spring 2022, Fall 2022, Spring 2023, Fall 2023

College Scholar, University Honors Day, The University of Texas at Austin
Academic Year 2022-23, Academic Year 2023-24

APR 2024 Research or Conference Travel Scholarship, The University of Texas at Austin
APR 2024 Competitive Scholarship, College of Liberal Arts, The University of Texas at Austin
MAR 2024 Pediatric Oncology Student Training (POST) Grant, Alex's Lemonade Stand Foundation

SEP 2023 Central Texas Mensa Scholarship, Mensa Education & Research Foundation
AUG 2023 Winner, Summer Research Poster Competition, MD Anderson Cancer Center
JUN 2023 Government Department Scholarship, College of Liberal Arts, The University of Texas at Austin
JUN 2023 Mensa Foundation Scholarship, Mensa Education & Research Foundation
MAY 2023 CPRIT Research Training Award, Cancer Prevention & Research Institute of Texas (CPRIT)
MAY 2023 International Education Fee (IEF) Scholarship, The University of Texas at Austin
APR 2023 Second Year Excellence Award, College of Natural Sciences, The University of Texas at Austin

MAY 2022 International Education Fee (IEF) Scholarship, The University of Texas at Austin
MAR 2022 Research or Conference Travel Scholarship, The University of Texas at Austin
JAN 2022 Alpha Lambda Delta Honor Society, The University of Texas at Austin

SKILLS

Programming Languages: Python, MATLAB, R, Bash, HTML, C++
Technical Skills: Genome Analysis Toolkit (GATK), Samtools, VCFtools, High Performance Computing (HPC), MRI
Languages: Fluent in Korean