

COLE RUOFF

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Education

The University of Texas MD Anderson Cancer Center UTHealth Houston Graduate School of Biomedical Sciences

Houston, Texas

August 2024 – Present

- Doctor of Philosophy - PhD in Biomedical Sciences
- Relevant Coursework: Basic & Translational Cancer Biology; Biostatistics and Clinical Trials; Statistical Genetics; Machine Learning in Biomedical Informatics

University of Maryland

College Park, Maryland

August 2018 – May 2022

- Bachelor of Science in Computer Science; GPA: 3.64
- Relevant Coursework: Bioinformatics; Data Science; Calculus II; Linear Algebra; Data Structures; Algorithms; Programming Languages; Concurrency; Machine Learning; Applied Statistics; Statistics for Biomedical Researchers; Molecular and Cellular Biology; Genetics; Cancer Immunology

Experience

MD Anderson Cancer Center

Graduate Research Assistant

May 2025 – Present

- Investigated tumor evolution, therapy resistance, and metastasis in breast and prostate cancer via single-cell RNA and DNA sequencing data
- Collaborated with clinicians to coordinate tumor specimen collection for clinical studies

National Institutes of Health

Post-baccalaureate Fellow

June 2022 – August 2024

- Analyzed single-cell RNA sequencing data to identify non-genetic mechanisms of therapeutic resistance in various cancer cell lines
- Identified malignant cell states harboring resistance mechanisms in early drug response data
- Developed computational biology skills and familiarized myself with various bioinformatics tools through conducting research for individual project
- Presented individual research at multiple conferences and poster sessions

National Institutes of Health

Research Intern

Feb 2021 – June 2022

- Developed a machine learning approach to identifying the presence of a target cell type in low resolution spatial transcriptomics data
- Consulted and collaborated with multiple immunology laboratories to identify T cell functional activity in cancer microenvironment spatial transcriptomics data
- Developed an unsupervised breadth-first expansion algorithm relying on coexpression of genes to identify novel cell states in single-cell RNA sequencing data
- Presented individual research at University of Maryland and NIH poster sessions

University of Maryland FIRE Program

Peer Mentor

Jan 2020 – Dec 2020

- Trained new laboratory students in technical skills including pipette usage, PCR,

- gel electrophoresis, DNA/RNA purification and quantification, etc.
- Instructed students on general biology knowledge along with concepts involving aptamers, biosensors, and sequencing
- Hosted weekly meetings with students to receive updates on their progress in the lab and answer general lab questions
- Provided guidance to new students on their research projects in the lab
- Continued to work on personal research project to develop a biosensor that can detect trace amount of microRNA that are known to be biomarkers for cancer

University of Maryland

Research Assistant

May 2020 – August 2020

- Formed a mentorship with Dr. Brantley Hall in the Department of Cell Biology and Molecular Genetics who is also a member of the Center for Bioinformatics and Computational Biology
- Executed high-performance computing jobs with sequencing data from genomes of microorganisms from the human microbiome
- Developed Python scripts to analyze and annotate sequencing data (e.g. promoter discovery, motif identification, etc.)

University of Maryland FIRE Program

Undergraduate Researcher

Jan 2019 – Dec 2020

- Conducted research for the Molecular Diagnostics stream in the University of Maryland First-year Innovation & Research Experience (FIRE) program
- Worked with a research team to develop a biosensor that can detect trace amount of microRNA that are known to be biomarkers for cancer
- Contributed substantial hours in the lab each week to ensure continued progress on research project

Languages, Technologies, & Skills

- R; Python; Bash; Java; C; Ruby; OCaml; Swift
- High Performance Computing; Git/Github; Containerization; Command Line; Seurat; Jupyter
- Cell culture, PCR, Gel electrophoresis, DNA/RNA purification and quantification

Publications & Presentations

1. **Ruoff C**, Mitchell A, Mondal P, Gopalan V, Singh A, Gottesman M, Hannenhalli S. *Resistance signatures manifested in early drug response across cancer types and species*. **Cancer Drug Resist.** 2025;8:44. <https://dx.doi.org/10.20517/cdr.2025.112>
2. **Ruoff C**, Gopalan V, Hannenhalli S (05/2023). *Transcriptional Characterization of Drug- Resistant Cancer Cells*. **CCR Fellows and Young Investigators Colloquium**, National Cancer Institute, Rockville, MD. Poster
3. **Ruoff C**, Gopalan V, Hannenhalli S (04/2023). *Transcriptional Characterization of Drug-Resistant Cancer Cells*. **NIH Postbac Poster Day**, National Institutes of Health, Bethesda, MD. Poster
4. **Ruoff C**, Gopalan V, Hannenhalli S (12/2022). *Transcriptional Characterization of Drug-Resistant Cancer Cells*. **NCI Cancer Data Science Laboratory Seminar Series**, National Institutes of Health, Bethesda, MD. Seminar
5. **Ruoff C**, Gopalan V, Hannenhalli S (04/2022). *Combinatorial Approach to Detecting Emerging Rare Cell States in Tumors*. **UMD Undergraduate Research Day**, University of Maryland, College Park, MD. Poster
6. **Ruoff C**, Gopalan V, Hannenhalli S (08/2021). *Delineating Cellular Composition in*

Spatial Transcriptomic Data. **NIH Summer Research Presentation Week**, National Institutes of Health, Bethesda, MD. Poster

7. **Ruoff C**, Ternovskaia C, Wirt E (11/2019). *DNA-Based Biosensor for MicroRNA Detection*. **University of Maryland FIRE Summit**, University of Maryland, College Park, MD. Poster
8. **Ruoff C**, Wirt E, Barry L, Cao V, Goodson J, Winkler W, Spirito C (10/2019). *Aptamer Selection Against Mutant Bacterial Antiterminator Protein NasR R340K*. **UMBC Undergraduate Research Symposium**, University of Maryland Baltimore County, Baltimore, MD. Poster