Armaan Ahmed

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Education

- **The Johns Hopkins University** — Baltimore, MD
  B.S. in Applied Math & Statistics + B.A. in Mathematics; Senior; 4.00 GPA — *Aug. 2022 – June 2026*
- **Scarsdale High School** — Scarsdale, NY
  High School Diploma; 4.00 (4.15/4.30) GPA — *Aug. 2018 – July. 2022*

Skill Set and Interests

- **Programming:** Python, Java, Bash, C++, Javascript
- **Research:** Cancer/Population Models, Stochastic Processes, Analysis, Probability, Monte Carlo Simulations

Experience

- **Teaching Assistant/Tutoring** — Baltimore, MD
  The Johns Hopkins University — *Sept 2024 - Present*
  - **Machine Learning Teacher Assistant (Spring, 2025):** Graded assignments for 100 students
  - **Probability Teacher Assistant (Fall, 2024):** Lead discussion sections, grade assignments, and proctor exams.
  - **Intro to Computing Teacher Assistant (Fall, 2024; Spring, 2024):** Hold office hours for students, grade assignments, and assist in class.
  - **Physics II Learning Assistant (Spring, 2024):** Assist students during discussion section on problem sets.
  - **Learning Den Personalized Tutor (Fall, 2023):** Tutor students on subjects ranging from Organic Chemistry to Honors Linear Algebra.
- **Foo Lab** — Minneapolis, MN
  Student Researcher — *Jan 2025 - Present*
  - **Investigating effect of senescent cells on tumor and cancer-treatment dynamics:** Leading a project investigating theoretical therapeutic strategies containing both anti-cancer and senolytic treatments to effectively reduce the tumor burden.
  - **Examining the site-frequency-spectrum in a population with selection:** Working with both Profs. Jasmine Foo and Kevin Leder to examine the site frequency spectrum in a population having driver and neutral mutations.
- **Noble Lab** — London, England
  Student Researcher — *Feb 2024 - Present*
  - **Investigating properties of a universal tree balance index:** Performing analytical work to investigate expected values of the J_1 index, along with minimal values in a special class of trees.
  - **Investigating extinction therapy:** Used simulations and analytical work to understand the theoretical merits of a two-sequence cancer therapy, where the second drug is applied whilst the tumor is still undetectable.
- **Yaojun Zhang Lab** — Baltimore, MD
  Student Researcher — *Apr 2023 - Mar 2025*
  - **Studying protein phase separation:** Using course-grained molecular dynamics simulations (LAMMPS) to understand the two-step path a *de novo* protein undertakes during crystallization. Relevant modeling parameters are informed from experimental data, docking, and atomistic simulations.
  - **Investigating droplet exchange dynamics:** Using Leonnard-Jones particles in a phase separated system to study the dwell time of individual particles within the dense droplet.
- **Taekjip Ha Lab** — Baltimore, MD
  Student Researcher — *Oct 2022 - May 2023*

- **Rational protein engineering:** Worked with graduate student Jimin Kang to computationally design thermostable DNMT1 methyltransferase variants. Generated in silico mutation libraries and selected top candidates by using metal cofactor, DNA, and SAM binding screens. Performed MD simulations to verify thermostability using NAMD
- **Maintaining methylation markers during amplification:** Designed candidate target and primers to verify above results in vitro. Performed and optimized 37 °C SHARP amplification, an in-house method to isothermally amplify DNA. Performed protein purification.

- **Elmhurst Hospital Intern** Queens, NY
  Student Researcher and Intern *May 2022 - Jan 2024*
  - **2023 Summer Hospital Volunteer:** Performed clinical work, shadowing, and research. Called on patients, asked questions, and delivered relevant paperwork. Watched surgeries in the operating rooms, including open, laporoscopic, and robotic. Additionally, shadowed the surgical technology team. Aided in different database analyses.
  - **SEER cancer database exploratory analysis:** Performed database and survival analysis on SEER cancer cases. Analyzed survival difference depending on hospital accreditation status. Conducted all statistical analyses, wrote a manuscript on the results, and submitted poster to the International Conference on Surgical Cancer Care
  - **Analysis of referral, management, and treatment patterns for appendiceal neoplasms:** Performed an in-house retrospective chart review of all appendiceal neoplasms. Investigated patterns of presentation, referral, and management.

Manuscripts & Preprints

1. **Ahmed, A.**, Leder, K., & Foo, J. (2025). The Site Frequency Spectrum in an Exponentially Growing Population with Selection. *In preparation.*
2. **Ahmed, A.**, & Foo, J. (2025). A Theoretical Investigation into Incorporating Senolytics into Anti-Cancer Therapies. *In preparation.*
3. Manojlović, V.*, **Ahmed, A.***, Viossat, Y., Noble, R. (2025). Expected and minimal values of a universal tree balance index. *arXiv.* doi:10.48550/arXiv.2507.08615. *(Currently Submitting)*
4. Patil, S., **Ahmed, A.**, Viossat, Y., & Noble, R. (2024). Preventing Evolutionary Rescue In Cancer. *biorxiv.* doi:10.1101/2023.11.22.568336. *(Review & Resubmit to Genetics)*
5. **Ahmed, A.**, Whittington, J., & Shafaee, Z. (2023). Impact of Commission on Cancer Accreditation on Cancer Survival: A SEER Database Analysis. *Annals of Surgical Oncology.* doi:10.1245/s10434-023-14709-4

Conferences and Workshops

1. Patil, S., **Ahmed, A.**, Viossat, Y., & Noble, R. (2025). Preventing evolutionary rescue in cancer using two-strike therapy. Congress of the European Society for Evolutionary Biology, Barcelona.
2. Patil, S., **Ahmed, A.**, Viossat, Y., & Noble, R. (2025). A Theoretical Analysis of Sequential Two Drug Anti-Cancer Therapy. Society for Industrial and Applied Mathematics DC-Maryland-Virginia, Baltimore.
3. **Ahmed, A.**, Yang, R., & Zhang, Y. (2025). Exchange Dynamics of Single Molecule in Phase Separated Droplet. APS March Meeting, Anaheim.
4. **Ahmed, A.** & Zhang, Y. (2024). Computational investigation of a de novo designed protein that separates into liquid droplets before crystallization. Institute of Biophysical Research Retreat, Washington D.C.
5. Yang, R., Wang, C., **Ahmed, A.**, Grigorev, V., Moulick, R., Woodson, S., & Zhang, Y. (2024). Exchange Dynamics of Single Molecule in Phase Separated Droplet. Institute of Biophysical Research Retreat, Washington D.C.
6. Esparham, A., **Ahmed, A.**, Shoar, S., & Shafaee, Z. (2024). Impact of Obesity on In-Hospital Outcomes Following Hepatic Resection: A Propensity Score Matched Analysis of the US National Inpatient Sample. Advanced Cancer Therapies, Puerto Rico.
7. **Ahmed, A.**, Whittington, J., & Shafaee, Z. (2024). Patterns of presentation and delivery of care of appendiceal neoplasms in the municipal safety-net setting. Society of Surgical Oncology Annual Meeting, Atlanta.
8. Esparham, A., **Ahmed, A.**, Shoar, S., & Shafaee, Z. (2024). National Trends, Complications, and In-hospital Outcomes for Patients Undergoing Immediate Implant-based versus autologous-based Breast Reconstruction: A Propensity Score Matched Analysis. Society of Surgical Oncology Annual Meeting, Atlanta.

*These authors contributed equally to the work.

9. **Ahmed, A.**, Whittington, J., & Shafaee, Z. (2024). Patterns of presentation and delivery of care of appendiceal neoplasms in the largest municipal health care delivery system in the United States. ASCO Gastrointestinal Cancers Symposium, San Francisco. doi:10.1200/JCO.2024.42.3_suppl.14
10. Kang, J., Momčilo, G., Urteaga, R. M., **Ahmed, A.**, & Ha, T. (2023). Engineered Helicase Replaces Thermocycler in DNA Amplification. The UKC.
11. **Ahmed, A**. & Shafaee, Z. (2023). Impact of Commission on Cancer Accreditation on Cancer Survival: A SEER Database Analysis. International Conference on Surgical Cancer Care, Boston. doi:10.1245/s10434-023-13332-7

Relevant Coursework

(Unofficial transcript available here)

- Honors Analysis I (110.415; A+)
- Honors Analysis II (110.416; A)
- Control Theory & Optimal Control (553.797; A)
- Graph Theory (553.672; A+)
- Stochastic Differential Equations: An Introduction With Applications (110.653; A)
- Game Theory (625.741; A+)
- Probability (553.620; A+)
- Honors Mathematical Statistics (553.431; A)

Awards

- **The Naddor Prize ($300 Award)** — Baltimore, MD
  The Johns Hopkins University — *Apr 2025*
  - **Award Description:** Provided for distinguished academic performance by an Applied Mathematics and Statistics student who is not a Senior.
- **Dean's ASPIRE Award Recipient ($2,250 Research Award)** — Baltimore, MD
  The Johns Hopkins University — *Jan 2024*
- **Dean's List (all semesters)** — Baltimore, MD
  The Johns Hopkins University — *Jan 2023*
- **Regeneron STS Semifinalist** — Washington D.C.
  Society For Science — *Jan 2022*

Extracurricular Activities

- **The Johns Hopkins News-Letter** — Baltimore, MD
  Writer — *Jan 2023 - Sep 2023*
  - **Volunteer writer for the SciTech column:** I generally write articles weekly about different scientific topics. Duties include researching topics, interviewing scientists, and writing articles.