Jesse S. Cool

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Education

Tufts University — *Medford, MA*
BS in Mathematics, Minor in Cognitive Science — *Sept 2022 – May 2026*
GPA: 4.0/4.0 (transcript) + Dean's List (all semesters)

University of Oxford, Pembroke College — *Oxford, UK*
Visiting in Mathematics and Philosophy — *Oct 2024 – June 2025*
1st class marks in all tutorials

Experience

Researcher — *Boston, MA*
Levin Lab, Allen Discovery Center — *Mar 2025 – present*

- Secured Tufts' Summer Scholars grant under Michael Levin, Samantha Petti, and Erik Hoel to support an undergraduate thesis on information capture within scales of complex systems
- Developed, simulated, and evaluated self-organizing systems in Python, analyzing information processing capability across scales with tools from information theory and probability

Researcher — *Boston, MA*
Petti Lab — *May 2024 – present*

- Co-authored in Bioinformatics (2025) on a novel, state-of-the-art structural alphabet for protein alignment
- Architected, trained, and evaluated vector-quantized variational autoencoders (VQ-VAEs) in PyTorch on HPC cluster as non-linear clustering tools for protein characterization
- Optimized bioinformatics pipeline using lDDT, Smith–Waterman, and BLOSUM bioinformatics metrics
- Reverse-engineered Foldseek to integrate our new structural alphabet, delivering an end-to-end pipeline
- Resolved complex technical challenges to establish a new industry benchmark

Volunteer Instructor — *Shirley, MA*
TUPIT and Petey Greene Programs — *July 2025 – present*

- Instructed mathematics courses for incarcerated students at MCI-Shirley through TUPIT and Petey Greene programs
- Structures and delivered adaptive lessons in basic math and probability, tailored to diverse educational backgrounds

Publications

An interpretable alphabet for local protein structure search based on amino acid neighborhoods — May 2025
S. Zerefa, **J. Cool**, P. Singh, S. Petti
10.1093/bioinformatics/btaf458/8240328 (Bioinformatics)

Projects

Captain's Log — *in progress*

- Engineered voice-logging application with on-device transcription and cosine-search for audio logging and memory recall

Trek Trivia — *2021*

- Curated community-sourced questions to increase diversity and challenge level of question bank
- Self-taught web development languages and architectures through self-directed learning; stems from my passion for Star Trek

Technologies

Languages: C++, Python, Java, ES6, Swift, React, Bash scripting

Software: NumPy, Pandas, PyTorch, scikit-learn, SciPy, CUDA, Git, Docker, Kubernetes, SLURM, Emacs, MongoDB, SwiftUI

OS: Linux-based, Arch, TrueNAS SCALE, any CLI