# Teaching Statement

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## Teaching Philosophy

I believe that effective teaching in Computer Science and Machine Learning should nurture both rigorous reasoning and creative exploration. My goal as an instructor is to help students not only understand how algorithms work, but also why they work, and how these ideas can be extended to new and interdisciplinary domains such as biological sciences.

I emphasize clarity through layered learning: starting with intuitive examples, building toward mathematical formalism, and finally connecting theory to real data. I firmly believe that meaningful learning happens when students take an active role in constructing knowledge. As such, my classrooms will always be student-centric. Students are encouraged to ask questions, test assumptions, come up with new ideas, and discuss them with peers. Whether teaching machine learning or computational biology, I want students to leave with both conceptual understanding and the confidence to pursue research independently.

## Teaching and Mentoring Experience

At Carnegie Mellon University, I served as a Teaching Assistant for two courses that deeply shaped my teaching perspective. In *Advanced Theory in Machine Learning* (by Dr. Pradeep Ravikumar), I worked with both graduate and senior undergraduate students to demystify advanced concepts such as VC dimension, convexity, and generalization bounds. Through problem sessions and office hours, I honed my skills on translating proofs into visual intuition and interactive coding exercises, making abstract ideas more tangible. In *Research and Innovation* (by Dr. Leila Wehbe and Dr. Bogdan Vasilescu), I mentored undergraduate students through all stages of independent research, from formulating hypotheses, designing experiments, analyzing results, and presenting findings. Guiding early-stage researchers taught me the value of individualized feedback and the importance of cultivating resilience and ownership in the research process.

At Princeton University, I was a co-lecturer for a graduate seminar on *Machine Learning and Algorithms for Medicine*. The course brings together students from diverse background such as computer science, molecular biology, and other quantitative disciplines to explore how data-driven models are reshaping modern healthcare and biological science. I design and lead lectures on topics such as protein language models, representation learning, and sequence alignment, emphasizing how core algorithmic ideas translate to biological discovery. This experience has reinforced my belief that interdisciplinary teaching can inspire students to think beyond disciplinary boundaries.

Beyond formal teaching, I have mentored numerous undergraduates, master's students, and junior PhD researchers across various projects in machine learning and computational biology. My mentees have explored topics ranging from protein representation learning to large-scale genomic modeling, and several have gone on to publish papers or pursue graduate study. My mentoring philosophy centers on structured independence: I provide conceptual scaffolding early on, but progressively shift responsibility to the student as they gain confidence. I also emphasize collaborative learning, encouraging peer mentorship and joint presentations to strengthen communication skills.

## Future Teaching Vision

As a faculty member, I will build courses that integrate algorithmic thinking, statistical reasoning, and biological insight. I am able to offer foundational and specialized offerings in both Machine Learning and Computational Biology disciplines, such as:

- **Introduction to AI/Machine Learning** — A foundational course introducing the core principles of artificial intelligence and machine learning. Potential topics include regression, classification, clustering, dimensionality reduction, decision trees, and neural networks. Students will have opportunities to engage in meaningful, hands-on projects with genuine scientific value.
- **Algorithmic Thinking for Life Sciences** — A hands-on course focusing on data structures, graph algorithms, and optimization to problems in genomics and systems biology. This course will cater to students from different disciplines, including Computer Science and Life Sciences.
- **Advanced Topics in Representation Learning** — A graduate-level course focusing on problems related to representation learning of biological sequences. Potential topics include contrastive learning, multi-modal learning, and large language models for genomics/protein data.

I envision these courses as highly interactive and project-based, with students working in small teams to analyze open biological datasets and present their findings in research-style reports. Such experiences help students develop both technical fluency and scientific creativity.

A key part of my vision is to foster inclusive and equitable learning environments. I believe diversity in perspectives strengthens problem-solving and research innovation. To this end, I aim to design assignments that accommodate different learning styles, build diverse working groups, and provide mentorship opportunities for students from underrepresented backgrounds in STEM.

Ultimately, I see teaching and mentoring as extensions of my research mission—to bridge algorithmic rigor with biological discovery, and to empower the next generation of scientists to do the same. I want my students to leave my classes not only with stronger technical skills, but also with a sense of curiosity, confidence, and purpose that will carry into their future research and careers.