Loqman Salamatian - Teaching Statement

Teaching and mentoring are among the most intellectually engaging and rewarding parts of my work as an academic. I have twice served as a Course Assistant for CSEEW 6180: Modeling and Performance Evaluation, where I helped design and grade problem sets and exams, ran review sessions on queueing and stochastic modeling, and held regular office hours that often functioned as small-group tutorials. Most of my teaching has taken the form of **research mentoring**. Over the past five years at Columbia, I have **supervised 12 undergraduates and master's students** on diverse projects, ranging from designing Internet protocols and building transformer architectures for traffic simulation to measuring hypergiant peering connections and exploring quantum networking verification. Some of these projects produced prototypes (e.g., a proof-of-concept quantum network verification solver developed by an undergraduate I mentored, Kylie). Even when projects did not fully meet their original technical goals, students learned to frame research questions, design experiments, and interpret results rigorously, and they left with clearer problem statements, tangible intermediate milestones, and skills they could apply in both research and industry.

I believe it is important to tailor research experiences to each student's background, interests, and goals so that the work feels both challenging and meaningful. For undergraduates and master's students, I frame projects that are ambitious yet achievable. For example, I worked with a master's student who had a strong background in machine learning but limited exposure to networking. I began with a narrowly scoped task: using speed-test data to train an anomaly detection model that flags unusual behavior in performance time series. As the project progressed, we shifted the focus from anomaly detection as an abstract ML problem to questions with clear networking relevance: examining whether these anomalies correspond to full-scale outages, how quickly such events can be detected from crowd-sourced measurements, and comparing them to existing Internet observatories. My broader goal in structuring projects this way is for students to ultimately understand the networking context, so I start from problems that align with their existing strengths and then gradually connect those problems to deeper networking concepts. I aim for projects that **teach both method and mindset**—how to design careful experiments, reason critically about data, and refine questions as understanding deepens. To me, success as a mentor is measured not only by publishing papers or completing projects, but also by whether students leave more curious and motivated to continue their research. One of my proudest moments as a mentor was seeing my former student, Cyrus, embark on a PhD at Columbia following our collaboration; he told me that it was the mentorship and research experience we shared that inspired him to pursue graduate school.

Teaching Interest: I am well prepared to teach the core networking curriculum at both the undergraduate and graduate levels, including courses on computer networks, Internet architecture, and more theoretical performance modeling. **My background in theoretical mathematics also allows me to teach mathematical classes for computer engineers and scientists** (e.g., linear algebra, discrete mathematics, algorithms, statistics). Beyond these foundational courses, I am excited to develop **classes that reflect the theoretical and empirical directions of my research**, particularly around reasoning from imperfect data—using statistical and algorithmic models to turn biased and partial measurements into useful representations of network structure and performance. Examples of courses I would be eager to offer include (non-exhaustive):

Modeling and Inference for Systems and Networking (graduate): A theory-driven course integrating causal inference, optimization, and statistical modeling, with applications to performance diagnosis, topology discovery, and system resilience.

Optimization and Geometry in Networking (graduate): A mathematically oriented course covering tomography, optimal transport, and differential geometry as tools for modeling latency, routing, and Internet structure.

Networks and Society (undergraduate/cross-departmental): A cross-disciplinary course examining how infrastructure shapes and reflects global power dynamics, and how routing, content delivery, and data localization intersect with access, sovereignty, and equity. Drawing on real-world measurement examples, the course encourages students to view the Internet as a socio-technical system and to consider the broader implications of technical design choices.

Teaching Philosophy: At the core of my teaching philosophy are three dimensions.
First, **I emphasize building context around methods**. Students remember technical material best when they understand not just how something works, but why it was created. For example, when teaching congestion control, I start with the Internet's near-collapse in the late 1980s: queues filled faster than they drained, routers dropped bursts of packets, and throughput fell to near zero. Van Jacobson's key insight was that the network should conserve packets: no new packet should enter unless one has exited. From this principle followed the mechanics of TCP: slow start, multiplicative decrease, and additive increase. By walking students through this chain—from problem to principle to mechanism—they see design not as a collection of formulas, but as reasoning shaped by constraints. This approach provides them with an intuition that they can apply even when studying modern variants of congestion control. **I reinforce this with frequent, low-stakes exercises that surface misunderstandings early and opportunities for students to revise their work after feedback without impacting their grades, so that improvement is continuous and visible.**
Second, I ground concepts in real systems and data. This helps students see how challenges arise in practice and how the solutions they learn apply. I emphasize active engagement through hands-on exercises, such as running BGP commands on a mini Internet. These activities anchor theory in practice, helping students develop concrete skills based on the theoretical tools they learn.
Third, I foster an environment where students feel supported to take risks, **learn from failure, and grow into independent thinkers**. I prioritize psychological safety by actively designing activities that normalize the experience of struggle. For instance, I conduct "post-mortems" on existing systems that have failed (e.g., major cloud outages), analyzing what went wrong without assigning blame to demonstrate that uncertainty and error are inherent parts of the engineering and scientific process.

I have been fortunate to work with advisors who embody this commitment. Their investment in students has made one lesson clear to me: **good teaching is not about getting through material, but about deliberately deciding which skills and habits students will carry with them.** That question is especially urgent now, as tools like large language models change what it means to "do the work" in many courses. In this environment, deep, intentional teaching that focuses on judgment, problem framing, and interpretation—rather than merely executing tasks—is more important than ever.

Broader Responsibilities. I also believe faculty have **responsibilities that extend beyond the classroom**. Our role includes **cultivating expertise** that policymakers, industry, and civil society can draw upon when making decisions with far-reaching consequences. In Internet measurement, this responsibility is especially pressing. Questions of security and sovereignty are embedded in the infrastructure itself, and students must learn to approach them with both technical skill and ethical awareness. **Teaching in this area, therefore, means more than imparting protocols and systems; it also involves preparing students to grapple with the social and political stakes of connectivity**, to understand how technical choices affect who has access, whose traffic is secure, and whose voices are heard online.
This sense of responsibility also shapes how I mentor students. The relationship between a student and their advisor is both apprenticeship and partnership, and I **do not believe in a one-size-fits-all model**. Some students need technical structure—for example, a first-year student might benefit from concrete milestones, regular meetings, and help breaking a large problem into tractable pieces. Others need more emotional support and perspective—for a senior PhD student facing paper rejections or job-market anxiety, the most useful conversation might be about recalibrating expectations, process feedback and deciding what to prioritize. Effective mentorship, to me, requires this kind of flexibility: adjusting how often we meet, where my feedback is focused, and whether a conversation centers on technical questions, logistics, or well-being. **My aim, as both teacher and advisor, is to help students become independent thinkers who can navigate both technical depth and societal context, and to leave them not only better prepared for their careers but also more confident in the responsibility that comes with their expertise.**