Maksym Andriushchenko — Teaching Statement

My goal in teaching is **to prepare students for real-world challenges** and **develop their capacity for independent thinking**. I believe it is crucial that students are up-to-date with the latest advances in AI, but also that they know well theoretical foundations to be able to reason from first principles. I have helped teaching **nine courses** in multiple institutions including *Machine Learning*, *Probability and Statistics*, and *Advanced Algorithms*. Additionally, I have supervised **thirteen students** at bachelor's, master's, and PhD level, whose work has led to academic distinctions and multiple top-tier publications [NeurIPS'21], [NeurIPS'24c], [ICML'24]. Looking ahead, I am eager to develop and **teach courses spanning responsible AI, AI safety, and LLM agents**, as well as more general courses related to LLMs, machine learning, introductory mathematics, and computer science.

Teaching Philosophy

Preparing for real-world challenges. Up-to-date technological knowledge is essential for preparing students for real-world challenges. I believe strongly in promoting *direct experimentation*—encouraging students to try things independently and build proof-of-concept projects as quickly as possible. This approach has been invaluable in my own research: starting with a prototype or baseline and then iterating on it is psychologically easier. Modern tools like LLM APIs make this especially accessible, as most traditional machine learning tasks—from image classification to text sentiment analysis and audio transcription—can now be accomplished with a single API call. This hands-on philosophy naturally extends to courses. A good example of this is the *ML for Science* projects within the *Machine Learning* course taught at EPFL. Students work in teams of three on realistic projects that directly benefit different research labs, emphasizing crucial collaboration and teamwork skills. This initiative has proven highly successful at EPFL, with around a hundred projects offered annually by various labs. To further engage students and reinforce practical skills, I believe focused hackathons and competitions can be particularly valuable, where students can apply their knowledge in intensive, shorter-term challenges.

Developing independent thinking. Scientific progress requires continuously questioning existing assumptions and deepening our understanding of various phenomena. This approach has been central to my work [ICML'22], [ICML'23b], [NeurIPS'24c], and I believe it should be strongly encouraged. Having completed my PhD in the Theory of Machine Learning group at EPFL, I understand that strong theoretical foundations are essential for developing a comprehensive view of the AI training pipeline. This principle extends to the latest advances in AI as well. In this rapidly evolving field, it can be challenging to separate meaningful developments from noise. For example, rather than speculating about LLM capabilities—which change with each new model release—it is crucial to ground our opinions in reality through direct experiments with state-of-the-art models.

Teaching Experience

I have had the opportunity to serve as a teaching assistant at multiple institutions. At Saarland University, I assisted in teaching the *Neural Networks: Implementation and Application* course led by Prof. Dietrich Klakow in 2017. I also assisted with the *Machine Learning* course taught by Prof. Bernt Schiele at the MPI for Informatics in 2018. At EPFL, I served as a teaching assistant for three courses: *Advanced Algorithms* (2020) taught by Prof. Michael Kapralov, which had over 200 students; *Probability and Statistics* (2021, 2022) taught by Prof. Emmanuel Abbé; and *Machine Learning* (2020, 2021, 2022, 2023) taught by Prof. Martin Jaggi and Prof. Nicolas Flammarion. The *Machine Learning* course was among EPFL's largest, with more than 600 enrolled students. My responsibilities included developing

lecture materials, creating homework assignments, and supervising ML for Science projects. Outside academia, I taught AI lectures to children (ages 7-12) displaced by the war in Ukraine during a summer camp in Romania. Since I grew up in Ukraine, I felt that I can meaningfully contribute by teaching basic AI concepts and promoting STEM. I have also engaged in other Ukraine-related support activities, including the #ScienceForUkraine volunteer initiative [SSRN'22], which has been helping displaced scientists and students find temporary positions.

Teaching Interests

I would be excited to teach courses that range from the latest advances in AI safety and LLM agents to basic mathematics for undergraduates. For example, I look forward to teaching the following courses:

- A course on responsible AI focusing on AI safety and security, adversarial robustness, privacy, science of evaluations, interpretability, and societal implications of AI. I would also be excited to give a seminar in this area, focusing on the most influential recent papers.
- A course on LLM agents covering LLM basics, teaching LLMs to use external tools, retrieval-augmented generation, reasoning and planning, software engineering agents, multi-agent systems, alignment techniques, and ethical considerations of using autonomous agents.
- A broad course on LLMs focusing on architectures (transformers, recurrent networks, state-space models), tokenization, pretraining, instruction tuning, in-context learning, advanced reasoning, and multimodal extensions of LLMs.
- A machine learning course at both undergraduate and graduate levels, focusing on theoretical foundations and hands-on collaborative projects.
- Diverse introductory courses in mathematics (e.g., probability, statistics, analysis) and computer science (e.g., algorithms, computer vision, information theory).

Advising Experience and Approach

Mentoring the next generation of AI researchers is one of my key goals. I have worked with a number of undergraduate (Mehrdad Saberi and Tiberiu Musat), master's (Oriol Barbany, Etienne Bonvin, Edoardo Debenedetti, Jana Vuckovic, Théau Vannier, Hichem Hadhri, Hao Zhao, and Joshua Freeman), and PhD students (Klim Kireev, Francesco d'Angelo, and Alexander Panfilov) from EPFL, ETH Zürich, and the University of Tübingen. Their work has been accepted at top-tier conferences [NeurIPS'21], [NeurIPS'24c], [ICML'24] and workshops [NeurIPS'24a WS], [NeurIPS'24c WS].

Edoardo's work on `RobustBench` [NeurIPS'21] has received academic recognition through a Best Paper Honorable Mention Prize at an ICLR Workshop [NeurIPS'21]. He continued with a master's thesis at Princeton with one of our RobustBench collaborators and went on a PhD program at ETH Zürich. Hao's work on understanding instruction fine-tuning of LLMs [ICML'24] received a nomination for EPFL Outstanding Master's Thesis. He is now applying for PhD positions and I am glad that I have contributed to this decision.

My advising approach is trying to understand what topics a student finds interesting, setting a clear vision about a problem that is of common interest, and making sure meaningful progress is regularly made. Rather than having students assist with small parts of larger projects, I prefer them to take leadership roles—typically as first authors on potential publications. While this approach is more challenging, it is also more rewarding. Students learn significantly more when they participate in every stage of research, from conducting initial experiments to writing the final paper.

References

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