



Postgraduate Course AI IN LEGAL PRACTICE AND ITS REGULATION

2026/2027

Curricular unit

Basics of AI (1st Week)

Responsible Academic staff and respective workload in the curricular unit

Daniel McNamee, Francesco Trapani

Syllabus

Lecture I (Francesco Trapani): Introduction to AI

We introduce the idea of intelligence, both natural and artificial, and discuss how the field of AI has evolved throughout history. We start with historical AI systems and move through biologically-inspired connectionist models, until today's data-driven deep learning systems. The goal is to understand how AI systems work in principle, how they evolved, and which technical properties—opacity, unpredictability, etc.— can create challenges for law and regulation.

Lecture II (Francesco Trapani): Neural Networks

We discuss the basic blocks of AI systems: artificial neurons. We start from the simplest learning system (1 neuron) and understand how it can learn using a feedback error signal. From there, we build up to small networks, and understand what it means to approximate a function. The goal is to understand the basics of the learning process, also keeping in mind which are the intrinsic limitations, constraints and biases.

Lecture III (Francesco Trapani) Reinforcement Learning

We explore AI systems that interact with the world through actions. In particular, we discuss Reinforcement Learning (RL), the core paradigm for such systems. We discuss its basic components, the classical learning approaches, and the distinction between model-free and model-based learning.

Main Bibliography

- Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep learning. MIT Press, <https://www.deeplearningbook.org/>
- An Introduction to Reinforcement Learning, Sutton & Barto (2018)
- Speech and Language Processing (3rd ed. draft), Dan Jurafsky and James H. Martin (2022, <https://web.stanford.edu/~jurafsky/slp3/>)
- What are large language models (LLMs)? <https://www.ibm.com/think/topics/large-language-models>
- Sumers, et al., 2024 Cognitive Architectures for Language Agents <https://arxiv.org/abs/2309.02427>