



## Syllabus

Academic Year	2026/2027
Program	Data Science and Management
Course	Deep Learning
Term	II semester
Year	1
SSD	INFO-01
Credits	6

INSTRUCTIONAL GOALS	<p>The course offers a comprehensive introduction to neural networks and deep learning. The main architectures (e.g. feedforward, convolutional and recurrent networks) and fundamental training techniques will be covered. Practical applications and experiential labs will complement the theoretical concepts.</p>
INTENDED LEARNING OUTCOMES	<p><b>Knowledge and understanding:</b> Students will understand the fundamental principles, challenges, and design choices underlying neural networks and deep learning models, analyzing the strengths and limitations of different architectures and training approaches.</p> <p><b>Applying knowledge and understanding:</b> Students will be able to develop innovative, data-driven solutions using modern neural network techniques, covering the full lifecycle from model training and validation to evaluation and deployment.</p> <p><b>Making judgements:</b> Students will be able to select the most appropriate neural network architecture for a given problem and critically assess the strengths and limitations of different architectures, training strategies, and evaluation methods presented in class.</p> <p><b>Communication skills:</b> Students will be able to master, with adequate terminological precision, the technical vocabulary relevant to neural networks and deep learning. Particular emphasis will be placed on oral presentations and pitches in project group work, as well as on writing technical reports and documentation.</p> <p><b>Learning skills:</b> Students will master tools and methods for designing, training, and validating neural networks, applying them to real-world problems that are typical of today's data-driven companies.</p>
Pre-requisites	Computer programming skills (Python). Foundations of machine learning.



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Course content	<ul style="list-style-type: none"><li>• Neural network foundations</li><li>• Backpropagation and optimization</li><li>• Deep feedforward networks</li><li>• Convolutional neural networks</li><li>• Sequence models (recurrent neural networks)</li><li>• Training best practices</li><li>• Python toolchain for deep learning</li></ul>
Reference Books	<ul style="list-style-type: none"><li>• Simon Prince, Understanding deep learning, The MIT Press, 2023</li><li>• François Chollet, Matthew Watson, Deep Learning with Python, 3rd Edition, Manning</li><li>• Lecture slides, research papers, notebooks and course material provided on the Luiss learning platform</li></ul>
Teaching Methods	<ul style="list-style-type: none"><li>• Traditional lectures</li><li>• Practical lab sessions</li><li>• Industrial testimonials</li></ul>
Assessment	<ul style="list-style-type: none"><li>• Midterm (1/3)</li><li>• Software project (1/3)</li><li>• Final exam (1/3)</li></ul>

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