IISER Pune - Course Content

Semester	AUG 2025
Open to Semester	7,9,31,33,21
Course Code	DS4144
Course title	Deep Learning
Nature of Course	LL - Lecture and Lab
Credit	4
Coordinator and participating faculty (if any)	**Dr. Bedartha Goswami**
Pre-requisites	For this year only: Linear algebra, probability, statistics (at the level of IISER-Pune mandatory courses)
Objectives	This course will provide a foundational introduction to deep learning. Students will be taught to work with modern neural network architectures involving feed forward, convolutional, recurrent, and attention layers. They will gain hands-on experience in the tutorials on how to build a deep learning model on their own and how to train it to give reliable results. They will understand the fundamentals of how neural networks are trained, how they learn, and how their results can be interpreted. Upon completion, the students will be able to work with state-of-the-art deep learning models and read and understand the relevant scientific literature on the topic. No such course exists at IISER Pune.
Course content	regularisation, optimisation, multilayer perceptrons, CNNs, RNNs, LSTMs, GRUs, transformers, graph neural networks, how to train your network, popular network architectures, explainable AI, adversarial robustness, fairness and ethics in AI
Evaluation / Assessment	Mid-sem: 30% End-sem: 50% Others: 20%
Suggested readings	- Deep Learning: Foundations and Concepts, Christopher M. Bishop & Hugh Bishop, Springer 2024. - Probabilistic Machine Learning, Kevin P. Murphy, MIT Press 2022 - Deep Learning, Ian Goodfellow, Yoshua Bengio, & Aaron Courville, MIT PRess 2016
When Next	Aug 2025
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