

**Title:** Principles of Deep Learning

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Deep neural networks (DNNs) are machine learning models inspired by how neurons perform computations in the animal brain. Over the past decade these models have led to revolutions in many fields of science and engineering, from making predictions of the next word on the keyboard of a mobile phone to selecting between cosmological models that best explain the structure of the universe. Although computer scientists have gained expertise in building these systems, they do not currently understand why they work and when they can fail. The goal of these lectures is to discuss our current understanding of why artificial networks are effective at learning typical tasks.

In Lecture 1 we will develop a working knowledge of deep networks and the basic ideas behind neural architectures; Lecture 2 will discuss tools to understand the training process of deep networks; Lecture 3 will discuss ideas on understanding generalization, i.e., when a model fitted upon the training set predicts well on new data.