

# EEP 596: Practical Introduction to Deep Learning Applications and Theory

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## Description

Welcome to EEP 596 “Practical Introduction to Deep Learning Applications and Theory”! This is a graduate level course aiming to provide **fundamental skills, concepts, and applications of deep learning** and neural networks for the investigation of complex datasets with heavy emphasis on hands-on practices.

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## Learning goals

**Understand fundamentals of artificial neural networks (ANN)** and their underlying principles making them generic computing frameworks.

**Build computational skills** for training such networks by understanding and working with algorithms such as stochastic gradient descent, Adam, Dropout, initialization etc.

**Survey different types of ANN models** to learn their strengths, limitations and apply them to a variety of real-world applications.

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## Topics covered (Tentative)

### Neural network fundamentals and feed-forward networks

Multi-Layer Perceptron (MLP)

Convolutional Neural Networks (CNN)

### Sequence models

Recurrent Neural Networks (RNN)

LSTM, GRU, Encoder-Decoder architectures

### Generative models

Generative Adversarial Networks (GANs)

Transformers

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## Class format

The class will meet every Wednesday where the class time will be divided into **Lectures** (Theoretical concepts) and **Lab** (Practice aspects). More information will follow on canvas upon publication.

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## **Requirements**

### **Theoretical aspects**

Basic understanding in multi-variable calculus, Linear Algebra, Statistics and Probability Theory.

### **Practical aspects**

Basic knowledge of computer science and Python programming skills.

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## **Grading (Tentative)**

**Fundamental concepts** (Canvas Quiz – individual, weekly): **20%**

**Hands-on practice** (Lab Assignment – individual, weekly): **40%**

**Real-world application** (Group Project – Team): **40%**