Department of Civil Engineering

Course Name:

Deep Learning

Course Number: -	**Credit:** 3
Program: Graduate	**Course Type:** Technical Selective
Prerequisite: -	**Corequisite:** -

Course Description (Objectives):

The aim of this course is to familiarize students with the concepts and techniques of deep learning and its applications in various problems. The focus is on training multilayer neural networks and exploring advanced architectures such as CNNs and RNNs.

Course Content (outline):

- Chapter 1: Introduction and overview of artificial neural networks
- Chapter 2: Multilayer perceptron
- Chapter 3: Backpropagation algorithm
- Chapter 4: Optimization in deep networks
- Chapter 5: Techniques for training, designing, and generalizing deep networks
- Chapter 6: Convolutional neural networks (CNNs)
- Chapter 7: Recurrent neural networks (RNNs)
- Chapter 8: Transformer architecture
- Chapter 9: Sum-product networks
- Chapter 10: Generative models
- Chapter 11: Deep reinforcement learning
- Chapter 12: Adversarial examples and the robustness of deep networks to adversarial examples
- Chapter 13: Advanced topics

References:

- Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, Book in preparation for MIT Press, 2016.
- Michael Nielsen, Neural networks and deep learning, Preprint, 2016.