

Course Syllabus for DS 776: Deep Learning

NOTE: This syllabus document contains the basic information of this course. The most current syllabus is available in the full course.

Course Description

Introduction to the theory and applications of deep learning. The course begins with the study of neural networks and how to train them. Various deep learning architectures are introduced including convolutional neural networks and transformers. Applications may include image classification, object detection, and natural language processing. Algorithms will be implemented in Python using a high-level framework such as PyTorch or TensorFlow.

Course Objectives

By the end of this course, you will be able to:

- **Understand Core Neural Network Architectures:** Describe and differentiate key neural network architectures, including convolutional neural networks (CNNs) and transformers, and their applications in computer vision and NLP.
- **Develop and Train Models in PyTorch:** Use PyTorch to build, train, and fine-tune neural network models for both computer vision and NLP tasks.
- **Apply Deep Learning to Computer Vision:** Implement CNNs and advanced architectures for computer vision applications, such as object detection, image classification, and segmentation.
- **Implement Transformer-Based Models for NLP:** Utilize transformer models to perform NLP tasks such as text classification, named entity recognition, text generation, and summarization.
- **Leverage the Hugging Face Ecosystem for NLP:** Use Hugging Face's models and tools to explore, fine-tune, and experiment with transformer-based NLP models.
- **Evaluate and Optimize Model Performance:** Assess model performance for both computer vision and NLP applications, using appropriate metrics to interpret results and improve accuracy.

Grading Policy

You will have homework sets for each lesson to complete. Your mastery of course content is assessed using a variety of methods:

Activity	Possible Points
Reading Quizzes (12)	120 total points
CoCalc Homework (12)	480 total points
Project (1)	100 points
TOTAL	700 total points

Final grades are assigned using the following scale:

A 90-100%

B 80-89%

C 70-79%

D 60-69%

F At or below 59%