INTRODUCTION TO DEEP LEARNING

1. Introduction to Neural Networks

- Overview of artificial neural networks (ANNs)
- Basic structure: neurons, layers, activation functions

2. Deep Neural Networks

- Understanding deep architectures
- Deep vs. shallow networks

3. Training Deep Neural Networks

- Loss functions and optimization
- Backpropagation and gradient descent

4. Popular Architectures

- Convolutional Neural Networks (CNNs) for image data
- Recurrent Neural Networks (RNNs) for sequential data
- Introduction to Transformers for NLP and sequence tasks

5. Applications of Deep Learning

- Computer vision: object detection, image classification
- Natural language processing: text generation, sentiment analysis
- Other domains: reinforcement learning, generative models

6. Challenges and Considerations

- Overfitting and regularization techniques
- Ethical considerations in deep learning
- Hardware and computational requirements

7. Hands-on Projects

- Implementing a simple neural network with TensorFlow or PyTorch
- Building a basic CNN for image classification
- Training an RNN for text generation