Deep Learning Course Syllabus – Artificial Intelligence College – AASTMT (Al-Alamin)

Weeks	Topics

1	• Perceptron
	    • Perceptron structure
	    • Perceptron learning algorithm
	    • Perceptron limitations

2	• Multilayer perceptron (MLP)
	    • MLP architecture
	    • Forward propagation
	    • Backpropagation

3	• Activation functions
	    • Overview of activation functions used in MLP.
	    • Comparison of different activation functions and their effects on MLP performance.
	    • Adaptive activation functions (e.g., Swish, Leaky ReLU)
	    • Activation functions for specific applications

4	• Regularization Techniques
	    • Dropout regularization
	    • L1 and L2 regularization (weight decay)
	    • Batch normalization and its effects on MLP training
	    • Early stopping and its role in preventing overfitting

5	• Optimization Algorithms

6
7
8
	• Introduction to convolution neural network
	    • Architecture of CNN (convolution and pooling)
	    • Padding
	    • Strides
	    • The advantages of CNN and it's applications
	• Training CNN from scratch
	• Using pretrained convnets

9
10
	• Deep learning for text and sequences
	    • One hot encoding
	    • Word embedding
	• Understanding Vanilla Recurrent neural network
	    • RNN model

	• Backpropagation through time • Vanishing gradients with RNN
11	• Gated recurrent unit (GRU)
12	• Long short-term memory (LSTM)
13	• Bidirectional LSTM • Attention mechanism
14	• Generative adversarial network (GANs)
15	Project discussions
16	Final exam