SYLLABUS

ARTIFICIAL INTELLIGENCE & DATA SCIENCE · COURSE HANDOUT 2026

DEEP LEARNING

URAL NETWORKS . BACKPRO
CNN . RNN . LSTM . TRANSF
SORFLOW . KERAS . PYTORC

DURATION	LEVEL	MODULES	MODE
60 Hours	**Advanced**	**8**	**Classroom · Online · Hybrid**

01 COURSE OVERVIEW

A deep learning course covering network architectures from dense layers to transformers. Learners build networks by hand before using frameworks, so training behaviour — initialisation, activation, gradient flow, regularisation — is understood rather than assumed. Vision, sequence and attention architectures each get a full module with a training project.

All work runs on TensorFlow, Keras and PyTorch with GPU sessions on Colab.

WHO IT IS FOR

- Learners who have completed a machine learning course
- AI and data science professionals
- Researchers and postgraduate students
- Engineers working on vision or speech

PREREQUISITES

Machine learning fundamentals, Python, NumPy and basic linear algebra.

02 LEARNING OUTCOMES

01 Explain forward and backward passes through a network.

02 Choose activations, losses and optimisers for a task.

03 Diagnose underfitting, overfitting and vanishing gradients.

04 Build convolutional networks for image tasks.

05 Build recurrent and LSTM networks for sequences.

06 Implement attention and read a transformer diagram.

07 Train efficiently with augmentation, callbacks and transfer learning.

03 MODULE STRUCTURE

8 MODULES

01 NEURAL NETWORK BASICS

- Perceptron
- Activation functions
- Gradient descent
- Multilayer networks
- Loss functions
- Backpropagation

LAB

NETWORK FROM SCRATCH IN NUMPY

02 TRAINING DEEP NETWORKS

- Initialisation
- Learning rate schedules
- Dropout
- Optimisers
- Batch normalisation
- Early stopping

LAB

TRAINING DIAGNOSTICS

03 FRAMEWORKS

- TensorFlow
- Keras sequential and functional API
- PyTorch tensors
- Autograd
- Datasets and loaders
- GPU usage

LAB

SAME MODEL IN KERAS AND PYTORCH

04 CONVOLUTIONAL NETWORKS

- Convolution and pooling
- Filters and feature maps
- Classic architectures
- Data augmentation
- Transfer learning

LAB

IMAGE CLASSIFICATION

05 SEQUENCE MODELS

- Recurrent networks
- LSTM
- GRU
- Sequence-to-sequence
- Time-series windows

LAB

TIME-SERIES FORECASTING

06 ATTENTION AND TRANSFORMERS

- Attention mechanism
- Self-attention
- Positional encoding
- Encoder and decoder
- Pretrained transformers

LAB

FINE-TUNE A SMALL TRANSFORMER

07 GENERATIVE MODELS

- Autoencoders
- Variational autoencoders
- GAN basics
- Diffusion overview
- Evaluating generated output

LAB

AUTOENCODER DENOISING

08 PROJECTS AND DEPLOYMENT

- Experiment tracking
- Model export
- ONNX
- Serving
- Inference optimisation

PROJECT

VISION OR SEQUENCE MODEL, TRAINED AND SERVED

04 ASSESSMENT & CERTIFICATION

Module assignments and labs	**25%**
Mini projects	**20%**
Internal assessments	**15%**
Final project and review	**40%**

CERTIFICATION

Learners who complete all modules, submit the final project and clear the review receive a course completion certificate from Kaizen Infinities Private Limited. Project work is documented for the learner's portfolio, and interview preparation is included in the closing sessions.

05 CAREER OUTCOMES

ROLES THIS PROGRAMME PREPARES FOR

DEEP LEARNING ENGINEER **AI RESEARCH ENGINEER** **COMPUTER VISION ENGINEER** **NLP ENGINEER** **MACHINE LEARNING ENGINEER**

CALL US
+91 73051 33996

EMAIL US
apply@kaizeninfinities.com

VISIT OUR WEBSITE
www.kaizeninfinities.com