

Deep Learning: Advanced Architectures & Deployment

Learn to build, train and deploy advanced neural network architectures, from ANNs and CNNs to RNNs and transformers.

2 Days

DURATION

8

MODULES

37

TOPICS

7

HANDS-ON ACTIVITIES

COURSE OVERVIEW

This course covers advanced machine learning concepts including optimisation techniques, regularisation and hyperparameter tuning, alongside the foundations of artificial neural networks. It then moves into deep neural network training tricks, convolutional neural networks with transfer learning, and recurrent architectures such as LSTM and GRU for sequence data. It also introduces transformer architectures including self-attention and the basics of BERT and GPT. Finally, it addresses model deployment, optimisation, monitoring, explainability and responsible AI practices.

WHO THIS COURSE IS FOR

Machine Learning Engineers

Data Scientists

Deep Learning Practitioners

AI Developers

MLOps Engineers

TOOLS AND REQUIREMENTS

Tools & Technologies Needed

- Python 3.8+
- Jupyter Notebook / JupyterLab
- Anaconda (optional but recommended)
- VS Code / PyCharm (optional)
- TensorFlow / Keras
- PyTorch
- NumPy, Pandas
- Matplotlib, Seaborn
- Scikit-learn
- OpenCV (optional, for CNN experiments)
- Laptop with at least 8GB RAM
- GPU optional (CPU works for small datasets)
- Azure ML / Google Colab / Kaggle Notebooks for GPU access

What You Will Learn

By the end of this training, participants will be able to:

- Understand advanced ML and ANN concepts including optimization, regularization, and hyperparameter tuning
- Build, train, and evaluate complex neural network architectures (ANN, CNN, RNN/LSTM)
- Apply transfer learning and modern deep learning practices
- Use advanced training strategies to improve model accuracy and reduce overfitting
- Understand sequence models, attention mechanisms, and basics of transformer architectures
- Deploy, optimize, and monitor models using industry-standard DL tools
- Apply best practices in model evaluation, explainability, and responsible AI

COURSE SYLLABUS

8 Modules, 37 Topics

DAY 1 Advanced ML & Artificial Neural Networks

01

1.5 hours

Advanced ML Concepts & Workflow

TOPICS

- End-to-end ML pipeline
- Cross-validation strategies
- **Regularization:** L1, L2, dropout
- Feature engineering best practices
- Hyperparameter optimization (Grid, Random, Bayesian)

02

1 hour

Optimization Techniques in ML

TOPICS

- **Gradient descent variants:** SGD, Momentum, Adam
- Learning rate schedules
- Loss functions & objective formulation

03

2 hours

4 Activities

Foundations of ANN

TOPICS

Biological vs artificial neurons · Activation functions · Weight initialization (Xavier, He) · Forward and backward propagation · Vanishing/exploding gradients

DAY 2

Deep Learning Architectures & Advanced Applications

04

1.5 hours

Deep Neural Networks (DNN) & Training Tricks

TOPICS

Batch normalization · Dropout · Residual connections · Faster convergence techniques

05

2 hours

3 Activities

Convolutional Neural Networks (CNN)

TOPICS

Convolution, kernels, padding, pooling · Feature extraction concepts · **Architectures:** LeNet, VGG, ResNet · Transfer learning & fine-tuning

06

1.5 hours

RNN, LSTM, GRU & Sequence Models

TOPICS

Recurrent connections · Long-term dependencies · Applications in text, speech, time-series · LSTM vs GRU · Limitations leading to Transformers

07

1.5 hours

Introduction to Transformers & Modern DL

TOPICS

Self-attention · Encoder/decoder structure · Architecture basics of BERT, GPT · How transformers outperform CNN/RNN · Fine-tuning vs prompt engineering

08

1 hour

Deployment, Optimization & Best Practices

TOPICS

Model export (SavedModel, ONNX) · Quantization, pruning, distillation · Monitoring model drift · MLOps overview · Explainability (SHAP, LIME) · Responsible & ethical AI

Practise What You Learn

#	MODULE	ACTIVITY
03	Foundations of ANN	HANDS-ON LAB 1
		■ Build a Multi-Layer Perceptron (MLP) classifier
		■ Custom layers
		■ Activation functions
		■ Regularization and tuning
05	Convolutional Neural Networks (CNN)	HANDS-ON LAB 2
		■ Train a CNN on MNIST/CIFAR
		■ Visualize training
		■ Apply transfer learning with MobileNet/ResNet

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Hands-on exercises throughout the course
- Delivery by certified instructors and subject matter experts
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

Learn the Way That Suits You

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Live Online Classes (ILO)

Fly-Me-A-Trainer (FMAT)

Flexi (Self-Paced)

1-on-1 Training

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