Advanced Machine Learning — Complete Syllabus-Wise Topics with GeeksforGeeks Links

Unit 1 — Introduction (The Foundation)

• Paradigms of Learning Problems: https://www.geeksforgeeks.org/types-of-machine-learning/
• Perspectives and Issues in Deep Learning Framework: https://www.geeksforgeeks.org/introduction-to-deep-learning/
• Bias–Variance Tradeoff: https://www.geeksforgeeks.org/ml-bias-variance-trade-off/
• Types of Errors in ML: https://www.geeksforgeeks.org/types-of-errors-in-machine-learning/
• Overfitting & Underfitting: https://www.geeksforgeeks.org/underfitting-and-overfitting-in-machine-learning/
• Linear Algebra for ML: https://www.geeksforgeeks.org/linear-algebra-for-machine-learning/
• Vector Calculus Review: https://www.geeksforgeeks.org/vector-calculus/
• Gradient Descent and Variants: https://www.geeksforgeeks.org/gradient-descent-algorithm-and-its-variants/
• Momentum in Optimization: https://www.geeksforgeeks.org/optimization-techniques-in-deep-learning/
• Activation Functions: ReLU, Leaky ReLU, Softmax: https://www.geeksforgeeks.org/activation-functions-neural-networks/
• Softmax Specific: https://www.geeksforgeeks.org/softmax-activation-function/

Unit 2 — Convolutional Neural Networks (CNN)

• CNN Architecture: https://www.geeksforgeeks.org/convolutional-neural-network-cnn-in-machine-learning/
• Pooling Layers: https://www.geeksforgeeks.org/cnn-introduction-to-pooling-layer/
• Invariance and Stability: https://www.geeksforgeeks.org/introduction-to-cnn-invariance-and-equivariance/
• Variability Models: https://www.geeksforgeeks.org/convolutional-neural-network-cnn-models/
• Capsule Networks: https://www.geeksforgeeks.org/introduction-to-capsule-network/
• Dictionary Learning: https://www.geeksforgeeks.org/introduction-to-dictionary-learning/
• Regression and LISTA Connections: https://www.geeksforgeeks.org/regression-in-machine-learning/
• Transfer Learning: https://www.geeksforgeeks.org/transfer-learning-in-machine-learning/

Unit 3 — Dynamical Systems

• Recurrent Neural Networks (RNN): https://www.geeksforgeeks.org/introduction-to-recurrent-neural-network/
• LSTM (Long Short-Term Memory): https://www.geeksforgeeks.org/deep-learning-introduction-to-long-short-term-memory/
• Difference Between RNN and LSTM: https://www.geeksforgeeks.org/difference-between-rnn-and-lstm/
• Word Embeddings: https://www.geeksforgeeks.org/word-embeddings-in-nlp/
• Attention Mechanism: https://www.geeksforgeeks.org/attention-mechanism-in-deep-learning/
• Deep Belief Networks: https://www.geeksforgeeks.org/deep-belief-networks/
• Neural Turing Machines: https://www.geeksforgeeks.org/introduction-to-neural-turing-machines/
• Deep Reinforcement Learning: https://www.geeksforgeeks.org/reinforcement-learning-an-introduction/
• Stochastic Optimization: https://www.geeksforgeeks.org/stochastic-gradient-descent/
• Non-Convex Optimization: https://www.geeksforgeeks.org/non-convex-optimization-in-machine-learning/

Unit 4 — Deep Unsupervised Learning

• Autoencoders: https://www.geeksforgeeks.org/autoencoders-in-deep-learning/
• Variational Autoencoders (VAE): https://www.geeksforgeeks.org/variational-autoencoders/

• Generative Adversarial Networks (GANs): https://www.geeksforgeeks.org/generative-adversarial-network-gan/
• Applications of GANs: https://www.geeksforgeeks.org/applications-of-gans/
• Deep Generative Models: https://www.geeksforgeeks.org/generative-models-in-machine-learning/
• Maximum Entropy Distributions: https://www.geeksforgeeks.org/maximum-entropy-models-in-nlp/
• Comparison: VAE vs GAN: https://www.geeksforgeeks.org/difference-between-vae-and-gan/

Unit 5 — Deep Learning Research & Tools

• Object Recognition: https://www.geeksforgeeks.org/object-recognition-in-deep-learning/
• Sparse Coding: https://www.geeksforgeeks.org/introduction-to-sparse-coding/
• Computer Vision Overview: https://www.geeksforgeeks.org/introduction-to-computer-vision/
• Natural Language Processing (NLP): https://www.geeksforgeeks.org/natural-language-processing-overview/
• Stemming vs Lemmatization: https://www.geeksforgeeks.org/introduction-to-stemming/
• Tokenization: https://www.geeksforgeeks.org/nlp-how-tokenizing-text-sentence-words-works/
• Sentiment Analysis: https://www.geeksforgeeks.org/python-sentiment-analysis-using-vader/
• TensorFlow vs PyTorch: https://www.geeksforgeeks.org/difference-between-tensorflow-and-pytorch/
• Caffe, Theano, Torch Overview: https://www.geeksforgeeks.org/deep-learning-frameworks/
• Kaggle Projects: https://www.geeksforgeeks.org/top-kaggle-projects-for-deep-learning/