Course Instructor: Dr Chiranjib Sur

Course Webpage: https://chiranjibsuruf.github.io/courses/da312.html

Email: chiranjib@iitg.ac.in

Objectives: Advanced Machine Learning Laboratory course bridges theory to practice, teaching you how to design, train, debug, and deploy robust ML systems on real, messy datasets. It builds the experimental mindset and tooling skills (pipelines, tuning, evaluation, reproducibility) that separate "models that run" from "models that work." A lab project proves you can execute the full ML lifecycle: data to model to results, with rigorous evaluation and clear ablation studies. It becomes a high-impact portfolio piece because it showcases hands-on competence with advanced methods and real-world constraints.

Prerequisites: Machine Learning, Deep Learning, Data Mining.

Course Code: DA312

Course Name: Advanced Machine Learning Laboratory

Credits: 0-0-3-3

Syllabus: Familiarization with TensorFlow/PyTorch; Implementation of MLP: Training Issues with Deep Networks, Applications; Autoencoders: Practical Applications; CNN: Constructing small networks to classify MNIST/CIFAR10, training issues; CNN: Realizing popular architectures, experiments with ImageNet scale data; Object/Face detection and localization; RNN and LSTM: training on sequences; Application in NLP: sentence representation using LSTM; Multimodal applications: vision and language.

Textbooks:

- Zhang, Aston, Zachary C. Lipton, Mu Li, and Alexander J. Smola, Dive into deep learning, 2021.
- Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.
- Michael A. Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

References:

- C. M. Bishop, Pattern Recognition and Machine Learning (Information Science and Statistics), 2nd Edition, Springer, 2011.
- S. O. Haykin, Neural Networks and Learning Machines, 3rd Edition, Pearson Education (India), 2016.