Course Number	EAI 6103
Course Credit	L-T-P-C: 3-0-0-3
Course Title	**Advanced Machine Learning**
Learning Mode	Online
Learning Objectives	This course aims to help the students to understand the advanced machine learning techniques and its application in various dimensions.
Course Description	This course will concentrate on some advanced topics of machine learning like graphical models, auto-encoders, GANs, time series forecasting, advanced unsupervised classification algorithms, neural architectures for sequence and graph-structured predictions. When appropriate, the techniques will be linked to applications in translation, conversation modeling, and information retrieval.
Course Outline	Mathematics of machine learning, Overview of supervised, unsupervised learning and Multi-task learning Undirected graphical models: Undirected graphical models: overview, representation of probability distribution and conditional independence statement, Factorization, CRFs, Applications to NLP Deep Networks for Sequence Prediction: Encoder-decoder models (case study translation), Attention models, LSTM, Memory Networks Deep Network for Generation: Sequence to Sequence Models, Variational Auto-encoders, Generative Adversarial Networks (GANs), Pointer Generator Networks, Transformer Networks, Learning Representations, Learning representations for text Models for continuous variables: Time series forecasting Modern clustering techniques Recent topics for solving various problems of natural language processing, bioinformatics information retrieval.
Learning Outcome	Students can design and implement advanced machine learning models, such as deep learning, and transfer learning. Students can apply advanced techniques, such as attention mechanisms, generative adversarial networks (GANs), and transformers. Students can analyze and solve challenging machine learning problems, including those involving large datasets, high-dimensional spaces, and complex relationships.
Assessment Method	Quiz / Assignment / ESE

Textbooks:

- Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. MIT Press 2012
- Ian Goodfellow, YoshuaBengio and Aaron Courville. Deep Learning. MIT Press 2016