

Branch Name:	Computer Engineering /Information Technology
Program Code:	ET103/ET105
Course Name:	Deep Learning and Applications [Specialization in AI & ML] (Professional Elective -III)
Course Code:	2ET1030604T
Pre-requisite Course:	Basic Statistics & Mathematics

Course Objectives:

- To understand the theoretical foundations, algorithms and methodologies of Neural Network
- To design and develop an application using specific deep learning models
- To provide practical knowledge in handling and analysing real world applications.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weight age (%)
1	Introduction: Historical context and motivation for deep learning; basic supervised classification task, optimizing logistic classifier using gradient descent, stochastic gradient descent, momentum, and adaptive subgradient method.	7	15
2	Deep Learning Architecture: Machine Learning and Deep Learning, Representation Learning, Width and Depth of Neural Networks, Activation Functions: RELU, LRELU, ERELU, Unsupervised Training of Neural Networks, Restricted Boltzmann Machines	7	20
3	Convolution Neural Networks: Introduction to convolution neural networks: stacking, striding and pooling, applications like image, and text classification. Transfer Learning: Transfer learning Techniques, Variants of CNN: DenseNet, PixelNet.	8	20
4	Sequence Modeling: Recurrent Nets: Unfolding computational graphs, recurrent neural networks (RNNs), bidirectional RNNs, encoder-decoder sequence to sequence architectures, deep recurrent networks, LSTM networks.	7	20
5	Auto encoders: Under complete auto encoders, regularized auto encoders, sparse autoencoders, de noising autoencoders, representational power, layer, size, and depth of auto encoders, stochastic encoders and decoders.	5	15
6	Deep Generative Models Deep Belief networks, Boltzmann Machines, Deep Boltzmann Machine, Generative Adversarial Networks	4	10

Reference Books:

1. Bunduma, N. (2017). Fundamentals of Deep Learning O'reilly Books.
2. Ian Goodfellow, YoshuaBengio and Aaron Courville, "Deep Learning", MIT Press, 2017.
3. Josh Patterson, Adam Gibson "Deep Learning: A Practitioner's Approach", O'Reilly Media, 2017

4. Umberto Michelucci "Applied Deep Learning. A Case-based Approach to Understanding Deep Neural Networks" Apress, 2018
5. Giancarlo Zaccone, Md. RezaulKarim, Ahmed Menshawy "Deep Learning with TensorFlow: Explore neural networks with Python", Packt Publisher, 2017.
6. Antonio Gulli, Sujit Pal "Deep Learning with Keras", Packt Publishers, 2017.
7. Francois Chollet "Deep Learning with Python", Manning Publications, 2017.

Course Learning Outcomes (CLO):

On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the feed-forward and deep networks.	2 Understanding
CLO2	Design single and multi-layer feed-forward deep networks and tune various hyper-parameters.	2 Understanding
CLO3	Implement deep neural networks to solve a problem	2 Understanding, 3 Critical thinking
CLO4	Analyze performance of deep networks.	3 Applying, 2 Understanding

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
CLO1	M								L					L		
CLO2	M								M						M	
CLO3	L		L			L						M			M	
CLO4		M				L			M							L

H: High, M: Medium, L: Low