NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	**B.TECH / CSE**		
Course Title	**Deep Learning**		
Course Code	**CSHO23**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**-**	**Semester**	**VI & VIII**
Session	**~~July~~ / January 2021**	**Section (if, applicable)**	**A & B**
Name of Faculty	**Dr. Bala Krishnan R**	**Department**	**CSE**
Official Email	**balakrishnan@nitt.edu**	**Telephone No.**	**-**
Name of Course Coordinator(s) (if, applicable)	**NIL**		
Official E-mail	**NIL**	**Telephone No.**	**NIL**
Course Type (please tick appropriately)	**Honors Course**		

Syllabus (Approved in Senate)

UNIT - I DEEP NETWORKS

Deep Feedforward Networks - Learning XOR, Gradient Based learning, Hidden Units, Back-propagation and other Differential Algorithms, Regularization for Deep Learning, Optimization for training Deep Models.

UNIT - II CONVOLUTIONAL NETWORKS

Convolution operation, Motivation, Pooling, Convolution and Pooling as strong prior, Efficient convolution algorithms, Unsupervised features, Sequence Modeling: Recurrent and Recursive Nets, LSTM Networks, Applications - Computer Vision, Speech Recognition, Natural Language Processing.

UNIT - III LINEAR FACTOR MODELS

Probabilistic PCA and Factor Analysis, Independent Component Analysis (ICA), Autoencoders-Regularized Autoencoders, Representational Power, Layer size and Depth, Stochastic Autoencoders, Applications.

UNIT - IV REPRESENTATION LEARNING

Greedy Layerwise Unsupervised Pre-Training, Transfer learning and Domain Adaptation, Deep Generative Models.

UNIT - V DEEP LEARNING WITH PYTHON

Introduction to Keras and Tensorflow, Deep Learning for computer vision - convnets, Deep

Learning for Text and Sequences, Generative Deep Learning - Text Generation with LSTM, DeepDream, Neural Style Transfer, Generating images with variational autoencoders, Generative Adversarial Networks (GAN).

COURSE OBJECTIVES

1. To introduce building blocks of deep neural network architecture.
2. To learn deep learning algorithms and its problem settings.
3. To understand representation and transfer of knowledge using deep learning.
4. To learn to use deep learning tools and framework for solving real-life problems.
5. To use Python for Deep Learning.

MAPPING OF COs with POs

Course Outcomes	**Programme Outcomes (PO)** **(**Enter Numbers only**)**
1. Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains	2, 3
2. Incorporate transfer of knowledge in machine learning algorithms	2
3. Implement deep learning algorithms and solve real-world problems	3, 5, 6
4. Develop Deep Learning techniques using Python	3, 4, 6
5. Represent learning Models	3

COURSE PLAN – PART II

COURSE OVERVIEW

This course covers data sciences, focusing on various concepts of machine learning. It provides details about some of the well-known supervised and unsupervised learning algorithms.

COURSE TEACHING AND LEARNING ACTIVITIES **(** Add more rows)

Sl. No.	**Week/Contact Hours**	**Topic**	**Mode of Delivery**
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7	01.02.2021 to 05.02.2021 1 hour	Regularization for Deep Learning	Online (MS Teams)
8	01.02.2021 to 05.02.2021 1 hour	Regularization for Deep Learning	Online (MS Teams)
9	08.02.2021 to 12.02.2021 1 hour	Regularization for Deep Learning	Online (MS Teams)
10	08.02.2021 to 12.02.2021 1 hour	Regularization for Deep Learning	Online (MS Teams)
11	08.02.2021 to 12.02.2021 1 hour	Regularization for Deep Learning	Online (MS Teams)
12	15.02.2021 to 19.02.2021 1 hour	Optimization for training Deep Models	Online (MS Teams)
13	15.02.2021 to 19.02.2021 1 hour	Optimization for training Deep Models	Online (MS Teams)
14	15.02.2021 to 19.02.2021 1 hour	Optimization for training Deep Models	Online (MS Teams)
15	22.02.2021 to 26.02.2021 1 hour	**Cycle Test 1**	
16	01.03.2021 to 05.03.2021 1 hour	UNIT II: CONVOLUTIONAL NETWORKS	Online (MS Teams)

17	01.03.2021 to 05.03.2021 1 hour	Convolution operation, Motivation, Pooling	Online (MS Teams)
18	01.03.2021 to 05.03.2021 1 hour	Convolution and Pooling as strong prior, Efficient convolution algorithms, Unsupervised features	Online (MS Teams)
19	08.03.2021 to 12.03.2021 1 hour	Sequence Modeling:Recurrent and Recursive Nets, LSTM Networks	Online (MS Teams)
20	08.03.2021 to 12.03.2021 1 hour	Applications - Computer Vision, Speech Recognition, Natural Language Processing	Online (MS Teams)
21	08.03.2021 to 12.03.2021 1 hour	UNIT III: LINEAR FACTOR MODELS	Online (MS Teams)
22	15.03.2021 to 19.03.2021 1 hour	Probabilistic PCA and Factor Analysis, Independent Component Analysis (ICA), Autoencoders- Regularized Autoencoders	Online (MS Teams)
23	15.03.2021 to 19.03.2021 1 hour	Representational Power, Layer size and Depth	Online (MS Teams)
24	15.03.2021 to 19.03.2021 1 hour	Stochastic Autoencoders, Applications	Online (MS Teams)
25	22.03.2021 to 26.03.2021 1 hour	**Cycle Test 2**	
26	30.03.2021 to 02.04.2021 1 hour	UNIT IV: Representation Learning	Online (MS Teams)
27	30.03.2021 to 02.04.2021 1 hour	Greedy Layerwise Unsupervised Pre-Training	Online (MS Teams)
28	05.04.2021 to 09.04.2021 1 hour	Transfer learning and Domain Adaptation	Online (MS Teams)

29	05.04.2021 to 09.04.2021 1 hour	Deep Generative Models	Online (MS Teams)
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COURSE ASSESSMENT METHODS (shall range from 4 to 6**)**

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1	Cycle Test 1	As per academic schedule	1 hour	20
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3	Assignment 1	Feb 4th Week	-	15
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CPA	Compensation Assessment*	As per academic schedule		
5	Final Assessment*		2 hours	30

***mandatory; refer to guidelines on page 4**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. **Students' feedback through PAC meetings**
2. **Feedbacks are collected before final examination through MIS or any other standard format followed by the institute**
3. **Students, through their Class Representatives, may give their feedback at any time to the course faculty which will be duly addressed.**

COURSE POLICY (including compensation assessment to be specified**)**

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Email, in-person – after 4.00 pm.

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1. **One compensation assessment will be given after completion of Cycle Test 1 and 2 for the students those who are absent for any assessment due to genuine reason.**
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FOR APPROVAL

Course Faculty R-Bala Krish **CC-Chairperson** Amrishham **HOD**

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Course Faculty R. Bala Krish **CC-Chairperson** _____ **HOD** _____