MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

COURSE PLAN

Department	**Computer Science and Engineering**	**Programme**	**BTech (CSE-AIML)**
Course Name	DEEP LEARNING	Course Code	CSE 3271
Semester	VI	Curriculum	2021
Name of the faculty	Dr ASHALATHA NAYAK	Academic year	2023-24
No. of Contact Hours/Week	L T P C: 3 0 0 3		

COURSE OUTCOMES (CO'S)

At the end of this course, the student should be able to:		**No. of Hours**	**Marks**
CO1	Choose right deep learning model and architecture for a given learning problem	6	14
CO2	Implement deep learning architecture on platforms	12	36
CO3	Comprehend and communicate the content of a research paper in the area of deep learning	4	10
CO4	Analyse application requirements for deep learning models	8	24
CO5	Evaluate the performance of the models using standard metrics	8	16
Total hours/ Marks		**36**	**100**

In semester & End semester plan and schedule (AY: 2023-24)

Component	Type	Max. Marks	Syllabus: Topics covered during	Schedule	Blooms taxonomy levels
MISAC 1	Surprise Assignment	5	Jan 3- Jan 27, 2024	Feb 5-10, 2024	3
MISAC 2	QUIZ	30	Jan 29-Feb 16, 2024	Feb 26-March 2, 2024	2 to 6
MISAC 3	Mid-Term Examination	5	Jan 3 – Mar 09, 2024	Mar 18-23, 2024	2 to 6
FISAC	MINI PROJECT	10	Jan 3-Mar 30, 2024	April 1-6, 2024	4 to 5
END Semester examination		50	L1 – L36		2 to 6

MISAC – Mandatory In semester Assessment Components

FISAC – Flexible In semester Assessment components

***Topics covered under FISAC 1 may vary depending on the assessment type chosen**

Blooms Taxonomy Level – FISAC 1 & 2			
No	**FISAC Components**	**First year**	**Higher semester**
A	QUIZ/MCQs	Same as MISAC 2 (2 to 6)	
B	Surprise Assignment	3	Same as MISAC 3 (4)
C	Take home assignment	3	4
D	Group Assignment	4	5
E	Seminar	4	5
F	Quiz based on invited talks	4	5
G	Development of SW/Apps	4	5
H	Mini Project	4	5

LESSON PLAN

Lecture No.	Topic	CO's addressed
L0	Introduction to the course	-
L1	Why deep learning? Trends in Deep Learning	CO1
L2	Mathematical Preliminaries: Tensors	CO1
L3	Neural network basics, Learning XOR	CO1
L4	Gradient-Based Learning: Computational graphs	CO2
L5	Hidden Units, Architecture Design	CO2
L6	Cost functions	CO2
L7	Bias, Variance	CO2
L8	Deep Feedforward Networks	CO2
L9	Back-Propagation Algorithm	CO2
L10	Convolutional Networks: Convolution Operation, Pooling, Convolution and Pooling	CO2
L11	Variants of Convolution Function	CO2
L12	Structured Outputs, Data Types	CO2
L13	Efficient Convolution Algorithms	CO2
L14	Random or Unsupervised Features	CO2
L15	Transfer Learning: Case study	CO2
L16	Modules for transfer learning	CO2
L17	Learning Algorithms, Capacity, Under and Overfitting, Hyperparameter and Validation Set	CO2
L18	Regularization for Deep Learning, Parameter Norm Penalties, Norm Penalties as Constrained Optimization	CO1
L19	Regularization and Under-Constrained Problems	CO1

L20	Dataset Augmentation, Noise-Robustness, Multi-Task Learning	CO1
L21	Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations	CO3
L22	Dropout	CO3
L23	Dropout, Adversarial Training	CO3
L24	**Optimization for Training Deep Models,** Challenges in Neural Network Optimization	CO3
L25	Basic Algorithms, Parameter Initialization Strategies	CO4
L26	Algorithms with Adaptive Learning Rates	CO4
L27	Approximate Second-Order Methods	CO4
L28	Optimization Strategies	C04
L29	**Recurrent and Recursive Networks,** Unfolding Computational Graphs, Recurrent Neural Networks	C04
L30	Bidirectional RNNs	C04
L31	Encoder-Decoder Sequence-to-Sequence Architecture	C04
L32	Deep Recurrent Networks, Recursive Neural Networks	C04
L33	LSTM	CO5
L34	Auto-encoders	CO5
L35	Generative Adversarial Networks	CO5
L36	Practical Methodology: Performance Metrics, Default Baseline Models, Selecting Hyperparameters, Debugging Strategies	CO5

References:

References

1	Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press 2016
2	Simon Haykin, Neural Networks and Learning Machines, PHI, 2008
3	François Chollet, Deep Learning with Python, Manning Publications, 2017
4	
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Submitted by:

Name of the faculty

Dr ASHALATHA NAYAK

(Signature of the faculty)

Date: 2/01/2024

Approved by:
(Signature of HOD)

Date: 3/01/2024

FACULTY MEMBERS TEACHING THE COURSE (IF MULTIPLE SECTIONS EXIST):

FACULTY NAME	SECTION	FACULTY NAME	SECTION
Dr. Ashalatha Nayak	A		
Dr. Muralikrishna S N	B		

COURSE PLAN – ADDITIONAL DETAILS

At the end of this course, the student should be able to:		No. of contact Hours	Marks	Program outcomes (POs)	Learning outcomes (LOs)	Program Specific outcomes (PSOs)	Blooms Taxonomy (BT)
CO1	Choose right deep learning model and architecture for a given learning problem	6	14	1	1,3	-	1 to 6
CO2	Implement deep learning architecture on platforms	12	36	2,12	3	-	1 to 6
CO3	Comprehend and communicate the content of a research paper in the area of deep learning	4	10	2,12	2	-	1 to 6
CO4	Analyse application requirements for deep learning models	8	24	2,12	2,3	-	1 to 6
CO5	Evaluate the performance of the models using standard metrics	8	16	2,5,12	1,3,5	1	1 to 6
Total hours/ Marks		**38**	**100**				

Mapping of course outcomes (COs) with Program outcomes (POs) and Program Specific outcomes (PSOs)

Course outcomes (COs)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	Choose right deep learning model and architecture for a given learning problem	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Implement deep learning architecture on platforms	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO3	Comprehend and communicate the content of a research paper in the area of deep learning	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO4	Analyse application requirements for deep learning models	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO5	Evaluate the performance of the models using standard metrics	-	2	-	-	2	-	-	-	-	-	-	2	2	-	-	-
Average Program Articulation Level		**2**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**		**-**	**-**

Mapping of course learning outcomes (CLOs) with AHEP Learning outcomes (AHEP LOs)

Course Learning Outcomes (CLOs)		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18
CLO3271.1	Choose right deep learning model and architecture for a given learning problem	□		□															
CLO3271.2	Implement deep learning architecture on platforms			□		□													
CLO3271.3	Comprehend and communicate the content of a research paper in the area of deep learning		□																
CLO3271.4	Analyse application requirements for deep learning models		□	□															
CLO3271.5	Evaluate the performance of the models using standard metrics	□		□		□													

Abbreviations

1. **CO – Course outcome**
2. **PO – Program outcome**
3. **PSO – Program Specific outcome**
4. **LO – Learning outcome**
5. **CLO – Course Learning outcome**
6. **BT – Blooms Taxonomy**
7. **AHEP – The Accreditation of Higher Education Programmes**