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

COURSE PLAN

Department	:	DEPT OF CSE
Course Name & code	:	DEEP LEARNING & CSE 5051
Semester & branch	:	II SEM, MTECH & OPEN ELECTIV(COMMON TO ALL BRANCHES)
Name of the faculty	:	DR. N. GOPALAKRISHNA KINI
No of contact hours/week:	:	L: 3, T: 0, P: 0, C: 3

Course Outcomes (COs)

	At the end of this course, the student should be able to:	No. of Contact Hours	Marks
CO1:	CO1: Understand different neural network architectures	5 Hrs	15
CO2:	CO2: Identify architectural principles of shallow and deep neural networks	11 Hrs	30
CO3:	CO3: Analyse the training parameters of deep networks and train RNN	10 Hrs	28
CO4:	CO4: Analyse convolutional architectures and their applications	6 Hrs	15
CO5:	CO5: Understand advanced topics in deep learning	4 Hrs	12
	Total	36 Hrs	100

Assessment Plan

Components	Assignments	Sessional Tests	End Semester/ Make-up Examination
Duration	20 to 30 minutes	60 minutes	180 minutes
Weightage	20 % (4 X 5 marks)	30 % (2 X 15 Marks)	50 % (1 X 50 Marks)
Typology of Questions	Understanding; Applying; Analyzing; Evaluating; Creating	Remembering; Understanding; Applying	Understanding; Applying; Analyzing; Evaluating; Creating
Pattern	Answer one randomly selected question from the problem sheet (Students can refer their class notes)	MCQ (10 marks): 10 questions of 0.5 marks each Short Answers (10 marks): questions of 2 or 3 marks	Answer all 5 full questions of 10 marks each. Each question may have 2 to 3 parts of 3/4/5/6/7 marks
Schedule	As notified by Associate Director (Academics) at the start of each semester	Calendared activity	Calendared activity
Topics Covered	Assignment 1 (L 1-9 & T_{y1-y2}) **(CO1 & 2)**	Test 1 (L 1-17 & T_{b1-b2}) **(CO1 & 2)**	Comprehensive examination covering full syllabus. Students are expected to answer all questions **(CO1-5)**
	Assignment 2 (L **10-17** & T_{y3-y4}) **(CO1 & 2)**		
	Assignment 3 (L 18-23 & T_{y5-y6}) **(CO3)**	Test 2 (L 18 - 27 & T_{b3-b4}) **(CO3 & 4)**	
	Assignment 4 (L 24 - 31 & T_{y7-y8}) **(CO3 & 4)**		

Lesson Plan

L. No./ T. No.	Topics	Course Outcome Addressed
L0	Introduction with syllabus discussion	-
L1	1. INTRODUCTION TO NEURAL NETWORKS: Introduction, Humans Versus Computers	CO1
L2	Basic Architecture of Neural Networks, Training a Neural Network with Backpropagation	CO1
L3	Practical Issues in Neural Network Training	CO1
L4	Secrets to the Power of Function Composition	CO1
L5	Common Neural Architectures, Advanced Topics	CO1
L6	2. MACHINE LEARNING WITH SHALLOW NEURAL NETWORKS Introduction	CO2
L7	Neural Architectures for Binary Classification Models	CO2
L8	Neural Architectures for Multiclass Models	CO2
L9	Backpropagated Saliency for Feature Selection	CO2

L10	Backpropagated Saliency for Feature Selection (Contd..)	CO2
L11	Matrix Factorization with Autoencoders	CO2
L12	3. FUNDAMENTALS OF DEEP NETWORKS What is Deep Learning, Common Architectural Principles of Deep Networks	CO2
L13	parameters, layers, activation functions, loss functions	CO2
L14	optimization algorithms, hyperparameters	CO2
L15	Building blocks of Deep Networks	CO2
L16	autoencoders, variational autoencoders	CO2
L17	4. TRAINING DEEP NEURAL NETWORKS Introduction, Back propagation	CO3
L18	Setup and Initialization issues	CO3
L19	Vanishing and Exploding Gradient problems	CO3
L20	Gradient-Descent Strategies	CO3
L21	Batch Normalization	CO3
L22	Practical tricks for Acceleration and Compression	CO3
L23	5. RECURRENT NEURAL NETWORKS(RNN) Introduction, Architecture of RNN	CO3
L24	Challenges of Training RNN, Echo State Networks	CO3
L25	Long Short Term Memory	CO3
L26	Gated Recurrent Units, Applications of RNN	CO3
L27	6. CONVOLUTIONAL NEURAL NETWORKS(CNN) Introduction, Basic Structure of CNN	CO4
L28	padding, strides, typical settings, ReLU layer, pooling	CO4
L29	fully connected layers, interleaving, local response normalization	CO4
L30	hierarchical feature engineering. Training a CNN	CO4
L31	Case studies of Convolutional Architectures, Visualization and Unsupervised Learning	CO4
L32	Visualizing the features, Convolutional Autoencoders. Applications of CNN	CO4
L33	7. ADVANCED TOPICS IN DEEP LEARNING Introduction, Attention mechanisms, Neural Networks with External memory, Generative Adversarial Networks	CO5
L34	Training a Generative Adversarial Network, Comparison with Variational Autoencoder	CO5
L35	Generating Image Data	CO5
L36	Conditional Generative Adversarial Networks, Competitive Learning	CO5

References:

1.	Charu C Aggarwal, "Neural Networks and Deep Learning", Springer International Publishing, 2018.
2.	Josh Patterson and Adam Gibson, "Deep Learning: A Practitioner's Approach", Oreilly, 2018.
3.	Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.
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Submitted by: DR. N. GOPALAKRISHNA KINI

(Signature of the faculty)

Date: 15-01-2020

Approved by: DR. ASHALATHA NAYAK

(Signature of HOD)

Date: 15-01-2020

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

FACULTY	SECTION	FACULTY	SECTION

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