DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	ARTIFICIAL NEURAL NETWORKS		
Course Code	EEPE21/EEOE21	No. of Credits	3
Course Code of Pre-requisite subject(s)	EE0E12		
Session	January 2019	Section (if, applicable)	
Name of Faculty	Dr. Sishaj P Simon	Department	EEE
Email	sishajpsimon@gmail.com	Telephone No.	0431-2503265
Name of Course Coordinator(s) (if, applicable)	~~Dr. S. Mageshwari~~ Dr. R. L. Josephine		
E-mail	mageshwari@nitt.edu	Telephone No.	0431-2503262
Course Type	[√] Core course	[ ] Elective course	

Syllabus (approved in BoS)

Introduction to Neural Networks - Biological Inspiration- Biological Neural Networks to Artificial Neural Networks – Classification of ANN Networks – Development of neural network models – Perceptron Network – Linear Separability.

Adaline Network – Madaline Network – Back propagation Neural Networks – Kohenen Neural Network – Learning Vector Quantization – Hamming Neural Network.

Adaptive Resonance Theory Neural Networks – Boltzmann Machine Neural Networks – Radial Basis Function Neural Networks – Bi-directional Associative Memory.

Hopfield Neural Networks – Support Vector Machines – Introduction to Spiking Neural Networks – Spike Neuron Models – Hybrid Neural Networks

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Neural Network Applications – Pattern Recognition – Forecasting models – Control and Identification – Data Mining – Classification and Clustering.

Text Books:

1. Hagan, Demuth, Beale, 'Neural Network Design', PWS Publishing Company, 1st Edition, 2002.
2. Freeman, J.A and Skapura, D.M., 'Neural Networks - Algorithms, Applications and Programming Techniques', Addison Wesley Publications, Digitized Reprint (2007), 1991.

Reference Books:

1. Satish Kumar, 'Neural Networks–A Classroom Approach', Tata McGraw-Hill Publishing Company Limited, 2013.
2. N.P. Padhy, S.P. Simon, 'Soft Computing with MATLAB Programming', Oxford University Press, 2015.
3. Simon Haykins, 'Neural Networks: A Comprehensive Foundation', Prentice-Hall Inc., 3rd Edition, 2008.

COURSE OBJECTIVES

- To learn the fundamentals of ANN and its application to electrical systems.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
H-High, M=Medium, L=Low	
1. Describe the development of artificial neural networks (ANN) and classify various ANN models.	PO1 PO2 PO3 PO4 PO5 PO6 PO7 H M M H M M M PO8 PO9 PO10 PO11 PO12 PO13 PO14 H H M H H M H
2. Solve and design various ANN models.	PO1 PO2 PO3 PO4 PO5 PO6 PO7 H M M M M H H PO8 PO9 PO10 PO11 PO12 PO13 PO14 M H M M H H H
3. Apply and construct ANN models to various applications of electrical systems.	PO1 PO2 PO3 PO4 PO5 PO6 PO7 M H M M M H H PO8 PO9 PO10 PO11 PO12 PO13 PO14 H H M M M H H

COURSE PLAN – PART II

COURSE OVERVIEW

Artificial neural networks use learning algorithms that are inspired by brain learning abilities. Various methods in neural networks have been developed for practical applications such as object recognition, image retrieval, pattern classification, function approximation and control.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	2nd week of January (3 contact hours)	Introduction to Neural Networks - Biological Inspiration	Lecture C&T/ PPT or any suitable mode Lecture
2	3rd week of January (3 contact hours)	Biological Neural Networks to Artificial Neural Networks	
3	4th week of January (3 contact hours)	Classification of ANN Networks – Development of neural network models	
4	5th week of January (2 contact hours)	Perceptron Network – Linear Separability.- **Assignment 1**	
5	1st week of February (1 contact hours)	Adaline Network – Madaline Network	
6	2nd week of February (3 contact hours)	Back propagation Neural Networks – Kohenen Neural Network	
7	3rd week of February (2 contact hours)	Learning Vector Quantization – Hamming Neural Network.- **Assignment 2**	
8	3rd week of February (1 contact hour)	Adaptive Resonance Theory Neural Networks **Assessment -1**	Written exam

9	1st week of March (1 contact hour)	Boltzmann Machine Neural Networks	Lecture C&T/ PPT or any suitable mode Lecture
10	2nd week of March (3 contact hours)	Radial Basis Function Neural Networks - Bi-directional Associative Memory.	
11	3rd week of March (3 contact hours)	Hopfield Neural Networks – Support Vector Machines **Assignment 3**	
12	4th week of March (3 contact hours)	Introduction to Spiking Neural Networks – Spike Neuron Models Hybrid Neural Networks **-Assignment 4**	
13	1st week of April (1 contact hour)	**Assessment -2**	Written exam
14	1st week of April (2 contact hour)	Neural Network Applications – Pattern Recognition **Group Tasks**	Lecture C&T/ PPT or any suitable mode Lecture
15	2nd week of April (3 contact hour)	Forecasting models – Control and Identification – Data Mining – Classification and Clustering. **Assignment 5**	
19	3rd week of April (1 contact hour)	**Assessment -3**	(Consolidation of periodic Assignments and Group Tasks)
19	3rd week of April (1 contact hour)	**Assessment -4** (Compensation)	Written exam
20	1st week of May (1 contact hour)	Assessment -5 (Final Assessment)	Written exam

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Descriptive type Written exam	3rd week of February	75 minutes	25
2	Descriptive type Written exam	1st week of April	75 minutes	25
3	Assignments after completion of each unit- (5 Nos)	Consolidation by 3rd week of April	-	10
4	Compensation Assessment	3rd week of April	75 minutes	25
5	Final Assessment	1st week of May	2 hours	40

COURSE EXIT SURVEY

- Feedback from the students during class committee meetings
- Anonymous feedback through questionnaire

COURSE POLICY

MODE OF CORRESPONDENCE

1. All the students are advised to check their NITT WEBMAIL regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/any other information regarding this course) will be done through their webmail only.
2. Queries (if required) to the course teacher shall only be emailed to the email id specified by the teacher.

ATTENDANCE

1. At least 75% attendance in each course is mandatory
2. A maximum of 10% shall be allowed under ON Duty (OD) category.
3. Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade

COMPENSATION ASSESSMENT

1. Any student who misses any of the continuous assessments (CAs) for genuine reasons [Assessment 1 or Assessment 2] can appear for CPA.

ACADEMIC HONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.

ADDITIONAL INFORMATION

The faculty is available for consultation at times as per the intimation given by the faculty.

FOR APPROVAL

Course Faculty 18/1/2019 CC-Chairperson for 22/1/19 HOD