



FIRST SEMESTER 2016-2017

COURSE HANDOUT (PART II)

Date: Aug 02, 2016

Course No: **MEL G622**

Course Title: **INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS**

Instructor-in-Charge: **ANANTHAKRISHNA CHINTANPALLI** (Office no: 2201-O)

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1. Course Description:

The course deals with an introduction and applications of artificial neural networks. It is mainly divided into four modules, wherein, the first module deals with the fundamental concepts of biological neurons and its artificial modeling. These concepts lay the basic foundations required for understanding the neural networks. The second module will cover the models of artificial neural networks, along with the various types of learning mechanisms that are required for training the networks. The third module will include the various network architectures for feed-forward and feedback networks. Finally, the fourth module deals with the various applications of artificial neural network in electrical engineering.

2. Scope and Objective:

To provide underlying concepts of artificial neural networks and its possible applications in electrical engineering. Lab components involve MATLAB exercises and project, which will provide students to gain hands-on experience along with the concepts gained in the class.

3. Prerequisites: There is no prerequisite for this course.

4. Textbook:

J. M. Zurada, *Introduction to Artificial Neural Systems*, Jaico Publishing House, Mumbai, India, 2012. ISBN: 81-7224-650-1.

Other Reference Books:

R1: K. Mehrotra, C. K. Mohan, and S. Ranka, *Elements of Artificial Neural Networks (2nd Edition)*, Penram International Publishing Private Limited Ltd, Mumbai, 2009. ISBN: 81-8797-220-3.





R2: R. J. Schalkoff, *Artificial Neural Networks*, McGraw Hill Education, New York, USA, 2011. ISBN 12-5900-237-3.

R3: B. Yegnanarayana, *Artificial Neural Networks*, Prentice Hall India Learning Private Limited publishers, Mumbai, India, 1998. ISBN 81-2031-253-8.

R4: MATLAB Online Tutorials.

Class lectures will be derived either from the text book or reference books and additional materials may be provided whenever necessary.

5. Course Plan:

Module	Lecture No.	Topics to be covered
Introduction	1	Overview of the course.
Introduction to Artificial Intelligence	2-4	Knowledge based systems, Pattern Classification, Machine Learning, Genetic algorithm and Artificial Neural Network.
Biological Neuron and its Modeling	5-7	Neurons and its significance. Mathematical modeling of neurons and its importance in the neural network.
Artificial Neural Networks and its learning mechanisms	8-16	Feedforward and feedback networks. Supervised and unsupervised learning schemes: Hebbian learning, Perceptron learning, Gradient descent algorithm, Widrow-Hoff, Correlation, Boltzmann.
Network Architectures/Topologies	17-32	Single-layer perceptron, Multi-layer perception, Back-propagation training. Competitive network, Hopfield network, Counter-propagation network.
Application of ANN	33-42	Speech processing/recognition, Speaker identification, Communication, Pattern/Image Classification, Power and Control systems.

6. Evaluation Scheme:

Evaluation	Durations	Weightage	Date, Time and	Remarks
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Component	(Mins)	(%)	Venue	
Mid Semester Test	90	25%	7/10 4:00 - 5:30 PM	Open Book/Close Book
Research Paper Presentation	To be announced in the class	10%		Individual
Labs (MATLAB)	Regular	10%		
Final MATLAB Project	To be announced in the class	15%		Project presentation. Report and MATLAB code submission in PDF
Comprehensive	180	40%	12/12 AN	Open Book/Close Book

7. Office Hours: Will be announced in the class.

8. Notices: Notices regarding the course will be displayed on the notice board of EEE (FDII).

9. Malpractice Regulations:

The following regulations are supplementary to BITS-wide policies regarding malpractices. A mal-practice will include but not limited to:

- Submitting some other student's solution as one's own.
- Copying some other student's MATLAB code or other forms of solution.
- Permitting some other student to see or copy or submits one's own solution.
- Or other equivalent forms of plagiarism wherein the student does not work out the solution and use some other solution or part thereof (such as downloading it from the LAN or the Web).

10. Make-up Policy:

- Prior permission of the Instructor-in-Charge is usually required to take a make-up for a test.
- A make-up test shall be granted only in genuine cases where - in the Instructor's judgment – the student would be physically unable to appear for the test.





BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus
Instruction Division

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- In case of an unanticipated illness preventing a student from appearing for a test, the student must present a Medical Certificate from BITS hospital.
 - In case of an unanticipated absence for a test due to a trip out of Pilani, the student must present a letter from his/her Warden or the Chief Warden certifying such absence and the reason(s).
 - Requests for make-up for the comprehensive examination – under any circumstances – can only be made to Dean, Instruction Division.
 - A make-up may not be granted for any other evaluation components.

Instructor-in-Charge

MEL G622



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