# 20AD41E4 - DEEP LEARNING

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| Course Category: | Professional Elective | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Knowledge in Machine Learning, Artificial Neural Networks.Mathematical concepts such as Statistics, Linear Algebra, Calculus, and Probability. | Sessional Evaluation:Univ. Exam Evaluation:Total Marks: | 4060100 |
| Objectives: | * Understand complexity of Artificial Neural Networks algorithms and their applications.
* Understand the context of neural networks and deep learning
* Know how to use a neural network
* Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.
* Understand the data needs of deep learning
* Have a working knowledge of neural networks and deep learning
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| Course Outcomes | Upon successful completion of the course, the students will be able to: |
| CO1 | Understand the fundamental concepts of Artificial Neural Networks and improve Deep Learning models |
| CO2 | Understand Artificial Neural Networks and How it relates to Deep Learning. |
| CO3 | Understand the basic concepts of Deep Learning and their Applications. |
| CO4 | Implement deep learning algorithms and solve real-world problems. |
| CO5 | Apply deep learning algorithms to solve real-time Problems. |
| CO6 | Build own deep learning project and differentiate between machine learning, deep learning. |
| Course Content | UNIT-I**Artificial Neural Networks:** Introduction, Define Artificial Neural Networks, Basic Building Blocks of Artificial Neural Networks, Artificial Neural Network Terminologies, Learning Rules, Applications of Artificial Neural Networks. **Perceptron Networks:** Single Layer Perceptron, Multi-Layer Perceptron.UNIT-II**Feed Forward Networks:** Back Propagation Networks, Radial Basis Function Network,Gradient Descent, Stochastic Gradient Descent.**Self-Organizing Maps:** Self -Organizing Feature Maps, Learning Vector Quantization.UNIT-III**Deep Learning:** Defining Deep Learning, Common Architectural Principles of Deep Learning, Basic Building Blocks of Deep Networks, Applications of Deep Learning, Python Frameworks for Deep Learning.**Activation Functions:** What is Activation Function, Binary Activation Function, Linear Activation Function, Non-Linear Activation Functions-Sigmoid, Tanh (Hyperbolic) ReLU, SoftMax Function.UNIT-IV**Deep Learning Architectures-I:** Unsupervised pretrained networks-Deep belief networks, Generative Adversarial Networks, Convolutional Neural Networks, Applications of Convolutional Neural Networks.UNIT-V**Deep Learning Architectures-II:** Recurrent Neural Networks, illustrative example, Long Short-Term Memory Networks, Recursive Neural Networks, Applications of Recursive Neural Networks.UNIT-VI**Building Deep Networks:** Images and Convolutional Neural Networks, Time series Sequences and Recurrent Neural Networks.**Deep Learning applications:** Image Processing, Natural Language Processing, Speech Recognition, Video Analytics |
| Text Books &ReferenceBooks | **TEXT BOOKS:**1. S N Sivanandam, S Sumathi, S N Deepa, Introduction to Neural Networks using Matlab 6.0, McGraw-Hill, 2008.
2. O’REILLY, Deep Learning a Practitioners Approach, Josh Patterson and Adam Gibson, 2017.

**REFERENCE BOOKS:**1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.
2. Taweh Beysolow II, Introduction to Deep Learning Using R, 2017
3. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
4. Golub, G., H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
5. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.
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| E-Resources | 1. [www.simplilearn.com/tutorials/deep-learning-tutorial/deep-learning-algorithm](http://www.simplilearn.com/tutorials/deep-learning-tutorial/deep-learning-algorithm)
2. [www.analyticsvidhya.com/blog/2021/05/introduction-to-supervised-deep-learning-algorithms/](http://www.analyticsvidhya.com/blog/2021/05/introduction-to-supervised-deep-learning-algorithms/)
3. [www.v7labs.com/blog/neural-networks-activation-functions](http://www.v7labs.com/blog/neural-networks-activation-functions)
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