

# Master of Science in Deep Learning and Artificial Intelligence

2 years degree program approved by UGC. Program managed by  
REVA Academy for Corporate Excellence in collaboration with CloudxLab





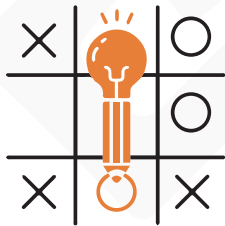
## Introduction

Artificial intelligence has permeated into every sphere of life, bringing smartness and efficiency in all our endeavors. AI today is seen as the panacea and accelerator for solving many of the nagging human problems. REVA Academy for Corporate Excellence and CloudX Labs proudly present a unique Masters' program loaded with experiential learning in a gamified environment with real-time projects solving life problems with AI.

## Program Highlights



Globally valid degree with WES recognition and UGC approval



Experiential Learning with Gamified Labs with Auto assessments



Opportunity to work with MNCs specified Real time projects



Alumni Status from REVA University and Reva Academy for Corporate Excellence



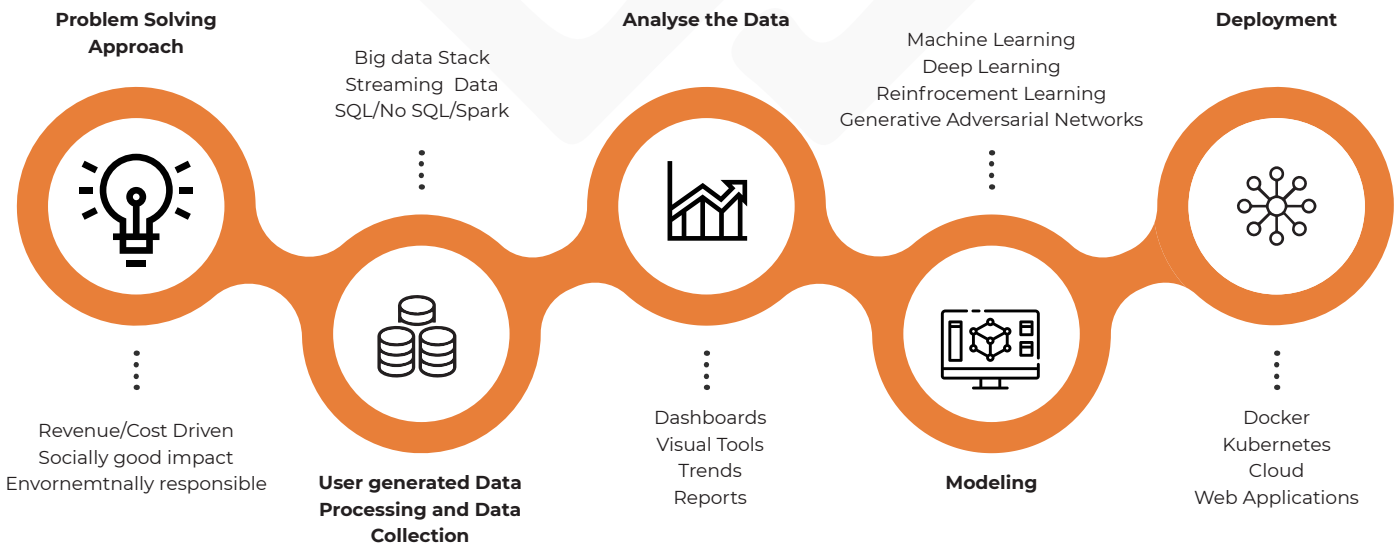
## Solving Life with AI

The cornerstone of the two-year Master's program in Deep Learning and Artificial Intelligence are sponsored projects in association with organizations who have set new benchmarks in AI implementation. The program participants will be part of at least two areas of focus from the broad areas listed. Participants will work problem formulation to solution deployment with an industry mentor on an area of their choice.



## Build Full Stack Data Science and AI Skills

This program builds an end-to-end, design to deployment skillsets to solve problems which is the most sought after skills in this booming industry. The program is designed to create real skills in working with 20 plus tools in a gamified environment



## First Semester

### 1. Software Engineering for AI

This course covers the software components required for machine learning. The student will be able to code in python and understand databases both structured and unstructured. This course covers the following contents:

- ❖ Python, Advantages and Disadvantages of Python, Basics of Python, IDE Overview, Programming Basics-List, Tuples, Sets & Dictionaries, Conditional Statements. Concept of Loops & Functions, List Comprehension, Functions, Object-Oriented Programming
- ❖ NumPy, Pandas, Numpy arrays, Numpy functions, Pandas, Data frame and manipulations, Visualization Libraries, Matplotlib packages, Distribution plots, Scatter plots, Heat maps
- ❖ Introduction to Linux, working with Linux, git introduction
- ❖ SQL Databases, SQL operations, Introduction to NoSQL

### 2. Mathematics for Machine Learning

This course covers the mathematics needed for Machine Learning. The student will learn mathematics for machine learning using python. This course covers the following contents:

- ❖ Statistics, mean, mode, median, standard deviation, skews, variance
- ❖ Representing matrices with NumPy, matrix operations, multiplication, inverse operations, solving equations using Gaussian elimination, Vectors, Cross Product, Dot Product, Eigenvalues, Eigen Vectors
- ❖ Calculus, Differentiation, Partial Derivatives, Chain rule, Power Series, Taylor Series, Linearization, Multivariate Taylors, Linear Regression, Least Squares. Newton Raphson, Gradient Descent
- ❖ Combination, Permutations, Probability theory, Bayes Theorem,

### 3. Machine Learning Fundamentals

This course introduces the students to machine learning. This will make the students able to understand the philosophy of machine learning, regression and classification. This course covers the following contents:

- ❖ Hands-on end to end machine learning example with regression
- ❖ Introduction to Classification, Metrics for Classification, Multi-label, Multiclass classification
- ❖ Training Machine Learning models, Polynomial regression, logistic regressions, regularization
- ❖ Training and Visualising Decision trees, CART training algorithm, GINI

## 4. Advanced Machine Learning

This course teaches advanced machine learning algorithms. This will make the students able to understand Support Vector Machine, Ensemble Learning, Principal Component Analysis, Unsupervised learning. This course covers the following contents:

- ❖ Support Vector Machines, Linear SVMs, Non-Linear SVMs, SVM Regression
- ❖ Random Forests, Ensemble Learning, Voting Classifiers, AdaBoost, Gradient Boost, Stacking
- ❖ Understand Dimensionality reduction, Manifold Learning, PCA, Kernel PCA
- ❖ Unsupervised learning, Clustering, K-Means, DB Scan, Gaussian Mixtures

## 5. Guided Projects

This hands-on Guided Project on Machine Learning will show the students how to solve real-world problems. The following projects will be covered in this course:

- ❖ Forecast bike rentals
- ❖ Finding the group of prospective buyers of new apartments

## Second Semester

### 1. Introduction to Deep Learning

This course will introduce the basics of Deep Learning and the Deep Neural Networks to the students. The students will be able to make custom Deep Neural Networks and train them. This course covers the following contents:

- ❖ History of Deep Neural Networks
- ❖ Backpropagation
- ❖ Keras
- ❖ Building Deep Neural Networks
- ❖ Training Deep Neural Networks

### 2. Advanced Deep Learning

This course will introduce the students with the advanced techniques for training and customising the deep neural networks. After this course, the students will be able to make custom Deep Neural Networks and train them. This course covers the following contents:

- ❖ Advance training techniques for neural networks
- ❖ Understand issues training large Deep Neural Networks
- ❖ Regularization for DNNs
- ❖ Deep Dive into Tensorflow and its lower-level API
- ❖ Custom Deep Learning Models: Writing custom models, implementing custom training
- ❖ Pre-processing large amounts of data for training



### 3. Computer Vision for Image and Video

In this course, the students will learn how Convolutional Neural Networks (CNNs) achieve superhuman performance on complex visual tasks. After this course, the students will be able to build Neural Networks that do computer Vision and process both images and video. This course covers the following contents:

- ❖ Introduction to CNNs, Filters, Pooling Layers, Building CNNs
- ❖ Overview of popular classification models, train classification models on a custom dataset
- ❖ Introduction to OpenCV, basic operations with OpenCV, filters, thresholding edge detection, processing videos
- ❖ Object Detection, Single Shot Detectors, YOLO, Training YOLO on a custom dataset.

### 4. Sequence Modelling

In this course, the students will learn how to use Neural Networks to predict future data using older data. After this course, the students will learn to model time series data with Neural Networks and predict future values. This course covers the following contents:

- ❖ Recurrent Neural Networks, Memory cells, Sequences, Training RNNs
- ❖ Forecasting a time series
- ❖ Simple RNNs
- ❖ Deep RNNs
- ❖ Long Sequences
- ❖ Unstable Gradients

### 5. Natural Language Processing

In this course, the students will learn the Natural Language Processing from its basics to advanced implementation. They will learn to use Deep Neural Networks for Natural Language Processing and Sentiment Analysis. This course covers the following contents:

- ❖ Generating Shakespearean text using RNNs
- ❖ Sentiment Analysis
- ❖ Encoder-Decoder Network for Neural Machine Transfer
- ❖ BEAM Search
- ❖ Attention Mechanisms

## Third Semester

### 1. Generative Adversarial Networks

This course introduces the students with Autoencoders and GANs. In this course, the students will learn about artificial neural networks capable of learning dense representations of input data without any supervision. This course covers the following contents:

- ❖ Data representations,
- ❖ Linear Autoencoders
- ❖ Stacked Autoencoders
- ❖ Convolution Autoencoders
- ❖ Recurrent Autoencoders
- ❖ Generative Adversarial Networks
- ❖ Training GANs
- ❖ Deep Convolution GANs
- ❖ Styling GANs

### 2. Reinforcement Learning

In this course, the students will learn to apply the power of Deep Neural Networks to Reinforcement Learning. The students will learn about artificial neural networks can be used to make powerful reinforcement learning applications. This course covers the following contents:

- ❖ Optimizing Rewards
- ❖ Policy Search
- ❖ Open AI Gym
- ❖ Markov Decision Processes
- ❖ Q-Learning
- ❖ Deep-Q Learning
- ❖ TF-Agents
- ❖ Curiosity Based Learning
- ❖ Difference between Curiosity Based Learning and Reinforcement Learning

### 3. Production and Maintenance of an AI system

This course introduces the students with different methodologies to deploy AI systems. The students will learn how to deploy AI systems on the cloud and embedded device. This course covers the following contents:

- ❖ Serving a TensorFlow model on a cloud, TensorFlow serving, create and use a prediction system on the cloud
- ❖ Creating lite models, deploy on embedded devices
- ❖ Models with GPUs, Colab
- ❖ Training models across multiple devices, model parallelism, data parallelism, distribute strategies for training, training with Tensorflow cluster

### 4. Recommendation Engine

This course teaches how to build a recommendation engine with machine learning. It also gives an exposure to building a recommendation engine. This course covers the following contents:

- ❖ Introduction to Spark MLLib
- ❖ Collaborative filtering algorithm
- ❖ Build recommendation engine in Spark MLlib using Alternating Least Square algorithm

### 5. Guided Projects

In this module, the students will work on guided projects where they will get the hands-on exposure to working real-world implementation of advanced deep learning techniques. The students will get an opportunity to work on the following projects:

- ❖ Neural style transfer project
- ❖ Deploy an AI system on the cloud

## Fourth Semester

### Dissertation Project

The program participants will take any research-oriented high-quality project of their choice that will end up with a live application, project report and a research paper.



## Eligibility for Admission<sup>1</sup>

The eligibility criteria for admission into the M.Sc. in Deep Learning program is:

- ❖ B. Tech/BE in any engineering stream with 50% (45% in case of candidates belonging to SC/ST) of marks in aggregate from any recognized University/ Institution as equivalent thereto.  
Or,
- ❖ BCA/B.Sc. in IT/CS/Electronics/Math with 50% (45% in case of candidates belonging to SC/ST) of marks in aggregate from any recognized University/Institution or any other qualification recognized as equivalent thereto.  
Or,
- ❖ B.Com/BBA/MBA with Computer Applications with 50% (45% in case of candidates belonging to SC/ST) of marks in aggregate from any recognized University/ Institution or any other qualification recognized as equivalent thereto. They should have studied Mathematics or Statistics at +2 level (Mandatory).  
Or,
- ❖ BA with courses in Economics with Mathematics and statistics courses  
And,
- ❖ Relevant work experience of a minimum of two years.

**Selection Process is based on an Entrance Exam and a Personal Interview.**

## Fee Structure

Total Fee: **4.8 Lakhs** (Year I: 3.8 Lakhs; Year II: 1.00 Lakh)

*Women candidates from STEM background can avail up to 80,000 discount on the total program fee.*

*Bank Loans are available from ICICI, Axis and HDFC Bank.*

## Contact

Admission Office

Phone: **+91-8049202224 (or) +1 (412) 568-3901**

Email: **reachus@cloudxlab.com**

Please find more information about the course :

**[www.cloudxlab.com/course/110/m-sc-in-computer-science-deep-learning-and-artificial-intelligence](http://www.cloudxlab.com/course/110/m-sc-in-computer-science-deep-learning-and-artificial-intelligence)**

1. Eligibility criteria are subject to revision by the Government, Statutory Bodies, such as AICTE, UGC from time to time.