



# Indira Gandhi Delhi Technical University for Women

## Centre of Excellence – AI, IGDTUW

(Supported by Department of Science and Technology (DST), GOI)

&

IGDTUW-Anveshan Foundation

## Eight Weeks Online Internship Program

On

## Machine Learning and Deep Learning

(8<sup>th</sup> June, 2021 to 31<sup>st</sup> July, 2021)

**Patron**

**Dr (Mrs.) Amita Dev**

Hon'ble Vice Chancellor, IGDTUW

**Coordinator**

**Prof. Arun Sharma**

Head – Dept. of AI and Data Sciences

## **Introduction:**

Indira Gandhi Delhi Technical University for Women (IGDTUW) has been upgraded from Indira Gandhi Institute of Technology in May 2013 vide Delhi State Legislature Act 9, 2012, as a non-affiliating teaching and research University at Delhi to facilitate and promote studies, research, technology, innovation, incubation and extension work in emerging areas of professional education among women, with focus on engineering, technology, applied sciences, management and its allied areas with the objective to achieve excellence in these and related fields

Centre of Excellence (CoE) in Artificial Intelligence (AI) at IGDTUW, established by the support of Department of Science and Technology (DST), GOI caters to the requirements of Under-graduate, Post-graduate and Doctorate programs in the domains of AI, Machine Learning and Deep Learning and various applications including Robotics, Drones, NLP and others. The centre serves as the perfect platform with necessary hardware and software infrastructure to serve as playground to the creative minds that solve real data driven problems at hand.

IGDTUW Anveshan Foundation is incorporated as a Section 8 company under the Company's Act 2013, MCA, GoI. It is promoted by 'Indira Gandhi Delhi Technical University for Women (IGDTUW)' and recently received status of DST – TBI. Prime objective of IGDTUW Anveshan Foundation is to motivate and facilitate budding entrepreneurs towards their successful entrepreneurial journey, proving their success story, contributing entrepreneurial spawning and ultimately converging benefits to the society.

## **Objectives of Internship:**

This internship aims to provide a concise introduction to the fundamental concepts in machine learning including mathematical foundations, programming tools and packages and popular machine learning and deep learning algorithms. The participants will gain knowledge in Machine/Deep Learning principles through a lot of practical applications covering industrial case walk-through and real-time applications.

**Eligibility:** UG, PG students and PhD Research Scholars

**Course Fee:** INR 2000/- for IGDTUW students and INR 3000/- for others

**Batch size:** 100

**Resource Persons:** Industry Professionals (IBM, Amazon, American Express and others), Academicians and Researchers

**Certificate:** At the end of the Internship, participants will get an Internship Certificate from Centre of Excellence – AI, IGDTUW (supported by DST, Govt. of India) and IGDTUW-Anveshan Foundation (Incubation Centre of IGDTUW supported by Govt. of NCT of Delhi).

## Funding Support

At the end of the Internship, a Demo Day will be organized for demonstrating all the projects developed. The team (of max. 3 participants) with best Project will be awarded with full fee refund. Next two teams will be awarded with 50% fee refund.

Innovative Projects may also get chance for seed funding and mentorship for further development and commercialization/patent of their project from Anveshan Foundation.

The projects with research flavour will be guided by the Faculty Mentors for writing a Research paper. University will support the Registration Fee (upto Rs. 5000/-) for presenting the Paper in the Conference. If a paper is accepted for SCOPUS Journal, students will also get Cash reward.

**Internship Scheme:** Internship has two components as mentioned below:-

Components	Dates
Online Sessions (Theory and Lab)	8 <sup>th</sup> June – 15 <sup>th</sup> July, 2021
Project Work	16 <sup>th</sup> July – 30 <sup>th</sup> July, 2021

## Important Dates

Last date to apply	:	4 <sup>th</sup> June, 2021
Internship Dates	:	8 <sup>th</sup> June, 2021 - 31 <sup>st</sup> July, 2021
Duration of online sessions	:	8 <sup>th</sup> June – 15 <sup>th</sup> July, 2021
Duration provided for project report	:	16 <sup>th</sup> July – 30 <sup>st</sup> July, 2021
Demo Day	:	31 <sup>st</sup> July, 2021

**Registration Link:** <https://bit.ly/3v46ocW>

## Bank's details for fee payment

Particulars	Details
Name & Address of the Beneficiary	IGDTUW Anveshan Foundation
Account Number of the Beneficiary	09001000021199
Name & Address of the Bank Branch	Punjab & Sind Bank, GGSIP University, Kashmere Gate, Delhi - 110006
Fee (Amount to be transferred)	Rs. 2000/- for IGDTUW students and Rs. 3000/- for outside IGDTUW students
IFSC Code	PSIB0001098

**For any further inquiry, please contact:**

<b>Prof. Arun Sharma</b> Head – Dept. of AI and Data Sciences, Dean (Exams) , IGDTUW Managing Director - IGDTUW – Anveshan Foundation <a href="mailto:arunsharma@igdtuw.ac.in">arunsharma@igdtuw.ac.in</a> , 9899202168	<b>Mr Rahul Sachdeva</b> Dy. Manager, IGDTUW – Anveshan Foundation <a href="mailto:anveshan@igdtuw.ac.in">anveshan@igdtuw.ac.in</a>
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## Major Contents of online session

### UNIT I - Python and Data Pre-processing:

**Python Programming** (Python data type and basic objects, Functions, Boolean and Conditionals, List, Loop and list comprehensions, String and dictionaries, Working with external libraries)

**NumPy** (NumPy Array Object, Array indexing, Array Slicing, NumPy Object Operations, Building Basic Functions with NumPy)

**Pandas** (Creating, Reading and Writing, Indexing, Selecting & Assigning, Summary Functions and Maps, Grouping and Sorting, Data Types and Missing Values, Renaming and Combining, Case study)

**Data Visualization** (Intro to Seaborn and Matplotlib, Line Chart, Bar Charts and Heatmaps, Scatter Plots, Distributions, Choosing Plot Types and Custom Styles, Project)

**Data Cleaning** (Handling Missing Values, Scaling and Normalization, Parsing Dates, Character Encodings, Inconsistent Data Entry)

### UNIT – II Machine Learning

How Models Work, Basic Data Exploration, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Missing Values, Categorical Variables, First Machine Learning Model, Model Validation, Pipelines, Cross-Validation, XGBoost/LightGBM/CatBoost, Data Leakage, Underfitting and Overfitting, Principal Component Analysis (PCA), Data Encoding

Regression Analysis, Random Forests, Support Vector Machine, Clustering with K-Means, Intro to AutoML, Case Study

### UNIT – III Deep Learning

This section will give practical hands-on experience of Deep Learning using Keras/TensorFlow and PyTorch with appropriate case studies.

**Introductory Deep Learning:** A Single Neuron, Deep Neural Networks, Stochastic Gradient Descent, Overfitting and Underfitting, Dropout and Batch Normalization, Binary Classification

**Convolutional Neural Network:** The Convolution Classifier, Convolution and ReLU, Maximum Pooling, The Sliding Windows, Custom Convnets, Data Augmentation

**Recurrent Neural Networks LSTM/GRU:** Recurrent Neural Networks (RNN), Long Short Term Memory (LSTM), Gated Recurrent Units (GRU), Time Series Data Classification, Sequence to Sequence Learning

### PROJECT WORK

## Day wise Program Schedule

Date	Topic	Instructor
08-06-2021	Inauguration Introduction about the Internship Introduction about Python (Variables, Control constructs, List, Directory)	Ms. Garima Jaiswal/ Ms. Dimple Sethi IGDTUW
09-06-2021	String and dictionaries, Working with external libraries	
10-06-2021	Python Packages (NumPy, Matplotlib, Pandas, Sklearn)	
11-06-2021	Python Packages (NumPy, Matplotlib, Pandas, Sklearn)	
14-06-2021	Reading Files, Cleaning, Munging and Manipulating Data	
15-06-2021	Data Visualization (Bar Charts, Line Charts, Scatterplots)	
16-06-2021	Data Visualization through Tableau	
17-06-2021	Data Pre-processing (Data Transforms, Rescale Data, Standardize Data, Normalize Data, Binarize Data, Feature Engineering, Feature Selection)	Dr Neha Bansal, British Council
18-06-2021	Basics of Machine Learning Concepts (Supervised, Unsupervised and Reinforcement Learning)	Dr Arun Sharma, IGDTUW
21-06-2021	Supervised Machine Learning (Linear Model, k-Nearest Neighbor, Naive Bayes Classifiers)	Dr Neha Bansal, British Council
22-06-2021	Decision trees, Logistic Regression	
23-06-2021	Random Forest	
25-06-2021	Evaluate Machine Learning Algorithms, Split into Train and Test Sets, K-fold Cross Validation, Confusion Matrix, Understand different error metrics such as MSE and MAE in the context of ML	Dr Niyati Baliyan, IGDTUW
24-06-2021	Unsupervised Learning (k-Means Clustering)	Dr. Mohit Sajwan, Bennett Univ
28-06-2021	Industrial Use case of Machine Learning like Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis, etc. (4 PM to 5 PM Self Study)	Ms. Garima Jaiswal/ Ms. Dimple Sethi IGDTUW
28-06-2021	Research Aspects in Machine Learning (3 PM to 4 PM)	Prof Naveen Prakash
29-06-2021	Security in AI	Mr Deepak Talwar, Microsoft
30-06-2021	General introduction of Neuron : biological neurons, perceptrons and multilayer perceptrons	Dr Chandra Prakash, NIT Delhi
01-07-2021	Neural Network and back-propagation	
02-07-2021	Introductory Deep Learning: A Deep Architecture: need, applications, Deep Learning Frameworks and Packages: TensorFlow/Keras/PyTorch overview	
05-07-2021	Deep Neural Net optimization, tuning, interpretability	
06-07-2021	CNN for Computer Vision	
07-07-2021	CNN for Computer Vision	Mr Saneem, IBM
08-07-2021	Speech and RNN	Shreya Khare - IBM Research Labs
09-07-2021	Recurrent Neural Network (LSTM/GRU)	Dr.Simranjit Singh, Bennett University
12-07-2021	NLP and Recurrent Neural Network (LSTM/GRU)	Dr.Simranjit Singh, Bennett University

13-07-2021	Social Media Analytics	Dr Rishabh Kaushal, IGDTUW
14-07-2021	Social Media Analytics Case Study	
16-07-2021	Project Overview and Project Identification	Prof Arun Sharma, IGDTUW
23-07-2021	Mid Progress Presentation	
29-07-2021	Final Project Report Submission	
30-07-2021	Final Demo Day	
31-07-2021	Award and Certification Distribution, Valedictory Function	

*Arun Sharma*