

Certificate Course on Applied AI, Data Analytics & Entrepreneurship

Subject Details

Subject Name: **Applied AI, Data Analytics & Entrepreneurship**

Contact Hours: 10 hours per week (Total 60 hours)

Credits: 3 credits

Duration: 6 weeks

Subject Area: Applied AI, Data Analytics & Entrepreneurship

Pre-requisite: Class 9 onwards

Target group: Students from Schools/colleges of NCT of Delhi

Intake Strength: 50 students

National Skills Qualifications Framework (NSQF) - Level 3

Weekly Hours: 10 hours per week

Course Objectives

1. To introduce students to the fundamentals of Artificial Intelligence and Machine Learning.
2. Build skills in prompt engineering and generative AI tools.
3. To develop a foundational understanding of data analysis by using Microsoft Excel and Python for data handling, cleaning, and calculations, and by visualizing insights through charts and graphs.
4. To introduce students to the fundamentals of entrepreneurship and innovation, enabling them to develop creative thinking, identify opportunities, and transform ideas into viable business concepts.
5. To develop a foundational understanding of Python programming, including its core features, syntax, and data structures.

Course Outcomes

By the end of the course, students will be able:

1. To understand core AI and machine learning concepts, analyze real-world applications, and recognize ethical issues such as bias, privacy, and responsible AI use.
2. To apply AI techniques by implementing basic machine learning models, using prompt engineering, and performing simple NLP tasks to generate and interpret outputs.

3. To apply the data analysis process by identifying data types, performing data handling and preprocessing using Excel and Python, and creating visualizations to interpret and present insights.
4. To generate innovative business ideas, develop basic business models, and effectively present (pitch) their startup concepts.
5. To understand fundamental programming concepts and Python language basics, and apply data types, variables, and operators to solve problems.

Salient Features of the Course

1. Course Content and Duration

This course is designed for students who want to explore Applied AI, Data Analytics, and Entrepreneurship, helping them develop problem-solving skills, think creatively, and build innovative ideas for the future.

2. Duration & Weightage

Total duration: 60 hours over 6 weeks

Theory: 50% (30 hours)

Practical: 50% (30 hours)

Unit-wise Topics

Unit 1: Fundamentals of Programming using Python

Basics of programming

Concept, need, applications

Introduction to Python

Features, advantages, Installing Python & IDEs (IDLE / VS Code basics), Writing and executing first Python program, Keywords, identifiers, comments, Basic input/output (print(), input())

Variables and assignment

Built-in data types, Numeric (int, float), String, Boolean, Type conversion (implicit & explicit)

Operators

Arithmetic, Relational, Logical, Expressions and precedence

Conditional statements

If, if-else, if-elif-else, Nested conditions

Looping constructs

For loop, while loop

Loop control statements

Break, continue, pass, Simple problem-solving using control flow

Functions

Concept of functions, Defining and calling function, Parameters and return values, Types of functions, Built-in, User-defined, Scope of variables (local/global)

Lists

Creation, indexing, slicing, Basic operations (append, remove, etc.)

Strings

Indexing, slicing, basic functions, Introduction to tuples and dictionaries (basic idea only)

Unit 2: AI and its Applications

Introduction to AI

Introduction to AI, how does AI work, ML and AI, Hard vs. Soft Computing, Recent examples of AI use cases, AI applications, AI in daily life, Learning systems, The role of data analysis with AI, Real-world case studies.

Introduction to Machine Learning

Introduction to machine learning, Supervised vs. unsupervised approaches. Model validation, Simple ML models with implementation using Scikit-learn. Regression, Classification, and Clustering Models with various performance measures. Sentiment Analysis and NLP.

Prompt Engineering

What is Prompt Engineering, Role in Generative AI tools (ChatGPT, AI assistants), Types of prompts: Instruction-based, Role-based, Few-shot prompting; Writing effective prompts, Prompt optimization techniques

Generative AI

Examples with Text, Image, Video generation, Tools overview, Use cases, Limitations, and risks

AI Ethics

Bias, privacy, responsible AI, Mini AI Project.

Unit 3: Data Analysis using Excel and Python

Introduction to Data Analysis

Purpose of data analysis, Types of Data, Structured and Unstructured data, Steps of data analysis, Microsoft Excel Basics, Interface, worksheets, Data entry and formatting, Formulas and Functions, SUM, AVERAGE, COUNT, IF statements.

Python Packages for Data Analysis

Numpy, Pandas, Matplotlib, NLTK. Reading CSV files, Data Frames, Usage of frames, pre-processing data using multiple Python frameworks, Data Formatting, Data Manipulation, Data normalization, Data Merging, Aggregation functions. Data Cleaning: Removing duplicates, Handling missing data.

Procedures and functionality of Data Mining in Analysis

Knowledge data discovery process, Data and attribute type, Discrete and continuous attributes. Techniques of Data pre-processing: Aggregation, Sampling, Dimensionality reduction, Feature selection and generation.

Data Visualization

Histograms, Boxplots, Venn Diagram, Bar Chart, Pie Chart, Line Chart, Scatter Plots.

Unit 4: Entrepreneurship Development

Introduction to Entrepreneurship

Creating and managing new ventures, focusing on opportunity and value creation, involves risk and innovation

Entrepreneurial Mindset

Creative and opportunity-oriented thinking, Traits: resilience, initiative, adaptability, Learning from failure

Idea Generation & Validation

Generate ideas (brainstorming, observation), identify customer needs, Test feasibility and demand

Basics of Innovation

New or improved solutions, Incremental vs disruptive, Drives competitiveness

Design Thinking

User-focused problem-solving, Steps: Empathize → Ideate → Test, Iterative approach

Business Model Basics

How business creates value. Key elements: customers, revenue, costs; Use of structured frameworks

Pitching Your Idea

Present idea clearly, Cover problem, solution, market; Communicate with confidence

Mini Startup Challenge

Hands-on team activity, Build and present idea, Apply learning practically

Reference Books:

- Paneerselvam, M. (2024). *An Introduction to Artificial Intelligence and Machine Learning*. S. Chand Publishing.
- Theobald, O. (2021). *Machine Learning for Absolute Beginners: A Plain English Introduction* (3rd ed.). Scatterplot Press.
- Han, J., Pei, J., & Tong, H. (2022). *Data mining: Concepts and techniques* (4th ed.). Morgan Kaufmann Ed.)
- Sundaradasu, S., & Sree, S. R. (2023). *Code with Python*. S. Chand Publishing.
- Cannon, J. (2018). *Python for beginners: Learn Python programming (Python 3)*

- Lambert, J., & Frye, C. (2021). Microsoft Excel Step by Step (Office 2021 and Microsoft 365). Microsoft Press.
- Ries, E. (2011). The lean startup: The million copy bestseller driving entrepreneurs to success. Crown Business.
- Computer Science with Python, Dhanpat Rai Publications.
- Python Programming: A Beginner's Guide, McGraw-Hill Education.
- Let Us Python, BPB Publications.
- Computer Science Class XI, NCERT Publications.
- Python Crash Course, No Starch Press.

Evaluation Scheme

- Practical Sessional (PRS): 20 marks
- Class Work Sessional (CWS): 20 marks
- End Term Examination (ETE): 60 marks

Grading System

- 40–50% → B
- 50–60% → B+
- 60–70% → A
- 70–80% → A+
- $\geq 80\%$ → O
- Minimum grade for certification: **B**
- Re-examination allowed if failed

Additional Features

- Emphasis on peer learning and community engagement