

Course Name: DS-201, **Programming for Artificial Intelligence**

Credit Hours: 2-1

Contact Hours: 2-3

Pre-requisites: Object Oriented Programming, Data Structures and Algorithm

### Course Introduction:

This course is designed to provide students with a comprehensive understanding of the foundations of programming for AI, as well as practical experience in applying AI techniques and methods to real-world problems. Emphasis is placed on hands-on programming and project work, as well as critical thinking and problem-solving skills. By the end of the course, students will have the skills and knowledge needed to pursue further studies and careers in the field of Artificial Intelligence.

CLO No	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understand the fundamental concepts and techniques of Artificial Intelligence including key concepts and algorithms in machine learning	C1 (Knowledge)
CLO-2	Implement and evaluate machine learning models	C3 (Apply)
CLO-3	Implement and train deep learning models for various applications	C3 (Apply)
CLO-4	Apply data pre-processing, feature extraction, and model evaluation to real-world problems	C3 (Apply)
CLO-5	Develop critical thinking, problem-solving, and communication skills through projects	C6 (Create)

### Course Outline:

#	Weekly Distribution of Course Contents
Week-1	Basics of linear algebra
Week-2	Probability models, including normal and binomial distributions
Week-3	Sampling and inference and predictive techniques
Week-4	Measures of central tendency and dispersion to summarise data
Week-5	Modify small programs for data manipulation
Week-6	Principles of data visualisation, visualisation solutions to real data
Week-7	Write programs to load, manipulate, visualise and store data

Week-8	AI Programming Tools and Libraries (scientific computing library, visualisation library, data manipulation and analysis library, and machine learning library.)
Week-9	Trade-offs involved in design-choices
Week-10	Using AI libraries for data loading, processing, manipulation and visualisation
Week-11	Model selection, customization and
Week12	Evaluations and performance metrics
Week-13	Analysis and interpretation of results
Week-14	Guidelines by social, professional and ethical issues
Week-15	Self-directed study
Week-16	Emerging Trends and Future Directions in AI

**Reference Materials:**

1. "Python Cookbook", David Beazley, Brian K. Jones, 3<sup>rd</sup> Edition, O'Reilly, 2013.
2. "Artificial Intelligence with Python", Prateek Joshi, Packt Publishing, 2017.
3. "Hands-on Machine Learning with Scikit-Learn and TensorFlow", Aurélien Géron, O'Reilly, 2017.