

Certificate/Diploma in Artificial Intelligence

Objective of the Course:

1. To introduce the artificial intelligence (AI) techniques to solve problems and search strategies to find optimal solution paths from start to goal state.
2. To introduces Python programing for solving AI problems.
3. To introduce the AI Agents their design, planning and learning techniques.
4. To introduce the basic data mining and visualization techniques.

Learning Outcomes:

1. Understand fundamental AI concepts and identify a range of symbolic and non-symbolic AI techniques.
2. Demonstrate an understanding of various AI algorithms
3. Use different ML techniques used in AI Applications.
4. Demonstrate an understanding of Statistical function used in AI

Duration of the Course:

- 1) Certificate course: 6 months
- 2) Diploma: 12 months

Eligibility: Any student enrolled in the degree program of the college and having knowledge about the basics of Computers.

Outline of the Course

Sr. No.	Subjects	
Subjects covered under Certificate Course are Sr No. 1,2 and 3		
1	GC-AI-01T Statistical Foundation GC-AI-01P Statistical Foundation Lab	Credits: 6 (4 Th. 2 Lab)
2	GC-AI-02T Core Python Programming GC-AI-02P Core Python Programming Lab	Credits: 6 (4 Th. 2 Lab)
3	GC-AI-03T Introduction to Logic GC-AI-03P Introduction to Logic Lab	Credits: 6 (4 Th. 2 Lab)
Subjects covered under Diploma Course are Sr No. 1,2,3,4,5 and 6		
4	GC-AI-04T Introduction to Data Visualization GC-AI-04P Introduction to Data Visualization	Credits: 6 (4 Th. 2 Lab)
5	GC-AI-05T AI using Python GC-AI-05P AI using Python	Credits: 6 (4 Th. 2 Lab)
6	GC-AI-06P Minor project	Credits: 6

Detailed Contents

Statistical Foundation

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 4

Pass Percentage: 35%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER:

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES:

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Section- A

Unit I: Scope, limitation and misuse of statistics. Types of data: primary, secondary, quantitative and qualitative data. Types of Measurements: nominal, ordinal, discrete and continuous data.

Unit II: Presentation of data by tables: construction of frequency distributions for discrete and continuous data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency distributions.

Unit III: Classification and Graphical representation of data (Pie Chart, Bar Diagram, Histogram, Frequency Polygon, Ogive Curve, etc.).

Unit IV: Measures of Central Tendency – Arithmetic Mean, Median and Mode and its Graphical representation, Measures of dispersion – range, variance, mean deviation, standard deviation

Section B

Unit V: Descriptive and Exploratory Analysis: Descriptive Statistics, Exploratory data analysis, Coefficient of variation, Data visualization

Unit VI: Correlation: Scatter plot, Karl Pearson coefficient of correlation, Spearman's rank correlation coefficient, multiple and partial correlations (for 3 variates only).

Unit VII: Regression: Introduction to regression analysis: Modelling a response, overview and applications of regression analysis, Simple linear regression (Two variables)

Unit VIII: Statistical inference: Introduction, Concept of Random Variable, Probability Mass Function & Density Function

Suggested Readings:

1. José Unpingco Python for Probability, Statistics, and Machine Learning, Springer, 2019
2. Statistics for Beginners in Data Science: Theory and Applications of Essential Statistics Concepts using Python, Ai Publishing, 2020

Statistical Foundation Lab

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 2

Pass Percentage: 35%

The programs in lab will be based on the contents covered in the theory syllabus.

Core Python Programming

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 4

Pass Percentage: 35%

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INSTRUCTIONS FOR THE CANDIDATES:

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Section A

Unit I: Introduction: Python installation and setup, Command line Basics; Python Objects.

Unit II: Data Structures Basics: Introduction to Python data types, Variable assignments, accepting input from the console, assignment statement,

Unit III: Expressions, operators and their precedence Numbers, String, String methods, Lists

Unit IV: Python Comparison Operators: Chaining comparison operators with logical operators, Pass Break and continue. write a lot of programs: interest calculation, primarily testing, and factorials.

Section B

Unit V: Program Flow control in Python: If Elif and Else statements in python, Loops: for loops, while loops

Unit VI: Methods and Functions in python: Introduction to functions, Def keyword, User defined functions, arguments and parameters, Parameter naming in python

Unit VII: Errors and Exception Handling: Introduction to errors, Built-in errors, raising errors in python

Unit VIII: File handling in Python: Files in python, importing own files, Read and writing text files, working with CSV, XML and JSON files.

Suggested Reading:

1. Timothy Budd, Exploring Python, TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Green Tea Pr, 2002
3. Paul Barry, Head First Python: A Brain-Friendly Guide, O'Reilly, 2nd ed. 2016
4. Udemy, <https://www.udemy.com/course/python-the-complete-python-developer-course/>

Core Python Programming Lab

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 2

Pass Percentage: 35%

The programs in lab will be based on the contents covered in the theory syllabus.

Introduction to Logic

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 4

Pass Percentage: 35%

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5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES:

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Section A

Unit I: Definition, Nature and Significance of Logic Truth and Validity;, Nature of Proposition; Traditional classification of Propositions; Quality, Quantity and Distribution of Terms.

Unit II: Truth-functional Logic: Truth-functional compound statements; Negation, Conjunction, Disjunction and Implication. Validity & Invalidity through Truth-table Method;

Unit III: Propositional Logic: Syntax of Propositional Logic, Logical Connectives: Truth Tables, Validity, Consistency, Logical Equivalence. Conjunctive and Disjunctive Normal Forms

Unit IV: Predicate Logic: Quantifiers, Translating simple syllogistic sentences to Predicate logic, Semantics of Predicate Logic, Conversion to Clausal form Resolution.

Section B

Unit V: Unification, Truth, satisfiability, validity in Predicate Logic.

Unit VI: Prolog: Introduction, Variables and atoms, Facts and predicates, data types, goal finding, Clauses,

Unit VII: Central Idea of Prolog, Execution of Prolog Programs, backtracking, simple object, compound objects, Operations: Arithmetic Operators

Unit VIII: Program Termination, Use of cut and fail predicates, Satisfiability: Use Unification, recursion, lists, simple input/output, dynamic database.

Suggested Reading:

1. Copi, Cohen, Jetli : Introduction to Logic, Pearson Education, 12th Edition, 2013
2. Timothy J. Ross, Fuzzy logic with Engineering Applications, 3 rd Ed. McGraw Hill, 2011

Introduction to Logic Lab

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 2

Pass Percentage: 35%

The programs in lab will be based on the contents covered in the theory syllabus.

Introduction to Data Visualization

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 4

Pass Percentage: 35%

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Unit -1 Data Mining: Introduction, Scope, What is Data Mining; How does Data Mining Works, Predictive Modeling: Data Mining

Unit II: Data Pre-processing: Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

Unit III: Data Mining Techniques- An Overview, Data Mining Versus Database Management System, Association rules, Classification, Regression, Clustering, Neural networks.

Unit IV: Clustering: Introduction, Cluster Analysis, Clustering Methods- K means, Hierarchical clustering

Unit V: Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Agglomerative clustering, Divisive clustering, evaluating clusters.

Unit VI: Exploring the Visual Data Spectrum: charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, Area Charts),

Unit VII: Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Infographics).

Unit –VIII: Applications of Data Mining: Introduction, Business Applications Using Data Mining- Risk management and targeted marketing, Customer profiles and feature construction, Medical applications (diabetic screening), Scientific Applications using Data Mining, Other Applications.

Suggested Reading:

1. Jiawei Han, Micheline Kamber and Jian Pei, Data Mining Concepts and Techniques, Third Edition, 2000
2. Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, Introduction to Data Mining, Pearson 2005,
3. M. Kantardzic, “Data Mining: Concepts, Models, Methods, and Algorithms”, 2nd edition, Wiley-IEEE Press, 2011
4. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2007

Introduction to Data Visualization Lab

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 2

Pass Percentage: 35%

The programs in lab will be based on the contents covered in the theory syllabus.

AI Using Python

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 4

Pass Percentage: 35%

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INSTRUCTIONS FOR THE CANDIDATES:

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Section A

Unit I: Introduction to ML: Applications of Machine learning, machine learning as a future;
Data Pre-processing: Importing the libraries,

Unit II: Importing the dataset, taking care of missing data, encoding categorical data

Unit III: Splitting the dataset into training set and test set, Feature scaling.

Unit IV: Regression: Simple linear regression, Multiple linear regression.

Section B

Unit V: Understanding the P-value, Polynomial regression, Classification: Logistic Regression, K-Nearest Neighbors, Support vector machine,

Unit VI Naïve Bayes, Decision tree classification, Random forest classification.

Unit VII: Clustering: k-means clustering, k means random initialization trap, selecting the number of clusters, Hierarchical clustering.

Unit VIII: Introduction to ANNs, Biological Neural Networks; Usefulness and Applications of ANNs; Architectures of ANNs: Single layer, Multi layer, Competitive layer; Learning: Supervised and Unsupervised; Activation functions.

1. Andreas C. Müller, Introduction to Machine Learning with Python: A Guide for Data Scientists, Sarah Guido, 2016
2. E. Alpaydin, Introduction to Machine Learning, 3rd Edition, PHI Learning, 2015
3. K. P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
4. <https://www.udemy.com/course/machinelearning/>

AI Using Python Lab

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 2

Pass Percentage: 35%

The programs in lab will be based on the contents covered in the theory syllabus.

Minor Project

Total Marks: 100

Credits: 6

Pass Percentage: 35%

Objective

Minor project will be allocated to each student. The student can develop the project in python language. The project report will be submitted by the student for evaluation and viva - voce based on project will be conducted.

Project Report evaluation is having a weightage of 75% and viva-voce is having a weightage of 25%.

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