DEPARTMENT OF PHYSICS

COURSE CURRICULUM & MARKING SCHEME

Certificate course on "*Machine Learning and its Applications*"

SESSION : 2022-23

ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE,

DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A + , College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

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DEPARTMENT OF PHYSICS

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG

Approved syllabus for Certificate course on "*Machine Learning and its Applications*" by the members of Board of Studies for the Session 2022-23

The syllabus with the paper combinations is as under

Course code: PHYML01

Overview: This course is designed for the final year undergraduate students having one of these subjects in their course i.e. Physics, Electronics and Computer Science and also for postgraduate students and research scholars of Physics Department. Participants will gain substantial knowledge of Machine Learning(ML) and Feature Selection Techniques along with Hand-On training.

Course Objectives:

- Introduction of installation and properties of Python software.
- Provide information and training on Regression and Classification Model in ML.
- Provide information and training on Model Selection in ML.

Course outcome:

By successfully completing the course, students will be able to:

- Get well –acquainted with the powerful and multi-disciplinary application learning.
- Also become capable to build an efficient prediction models.

Minimum Duration: 6 Months

Eligibility: After 10+2 from any recognized secondary education board of any state of India.

Medium of Instruction: English and Hindi

Maximum Age: 25 Years

Syllabus and Marking Scheme for Certificate course on "Machine Learning and its Applications"

Session 2022-2023

Paper No.	Title of the paper	Maximum Marks Allotted		
		Theory	Sessional	Total
1	Machine Learning -I	70	30	100
2	Machine Learning -II	70	30	100
3	Project	50		50
Total				250

Note: Minimum passing marks is 20%.

Paper I

Machine Learning –I

Unit 1

Introduction to Python

- Functions and Getting Help
- Booleans and Conditionals
- Lists
- Loops and List Comprehensions
- Strings and Dictionaries
- Working with External Libraries

Unit 2

Introduction to Machine Learning

- How Models Work
- Basic Data Exploration
- Your First Machine Learning Model
- Model Evaluation
- Underfitting and Overfitting
- Random Forests
- Machine Learning Competitions

Unit 3

Intermediate Machine Learning

- Introduction
- Missing Values

- Categorical Values
- Pipelines
- Cross-Validation
- Data Leakage

Unit 4
Pandas

- Creating, Reading and Writing
- Indexing, Selecting and Assigning
- Summary Functions and Maps
- Grouping and Sorting
- Data Types and Missing Values
- Renaming and Combining

Unit 5
Data Visualization

- Seaborn
- Line Charts
- Bar Charts and Heatmaps
- Scatter Plots
- Distributions
- Choosing Plot Types and Custom Styles

References

[1] Introduction to Data Science A Python Approach to Concepts, Techniques and Applications – J Laura Igual and Santi Seguí, Springer, e-book.
[2] https://www.kaggle.com/

Paper II

Machine Learning –I

Unit 1
Feature Engineering

- Introduction
- Mutual Information
- Creating Features
- Clustering with K-Means
- Principal Component Analysis
- Target Encoding

Unit 2
Data Cleaning

- Handling Missing Values
- Scaling and Normalization
- Parsing Dates
- Character Encodings
- Inconsistent Data Entry

Unit 3
Regression

- Simple Linear Regression
- Multiple Linear Regression
- Polynomial Regression
- Support Vector Regression
- Decision Tree Regression
- Random Forest Regression

Unit 4
Classification

- Logistic Regression
- K-Nearest Neighbors (K-NN)
- Support Vector Machine (SVM)
- Kernel SVM
- Naive Bayes
- Decision Tree Classification
- Random Forest Classification

Unit 5
Dimensionality Reduction

- Principal Component Analysis (PCA)
- Linear Discriminant Analysis (LDA)
- Kernel PCA

References

[1] Introduction to Data Science A Python Approach to Concepts, Techniques and Applications – J Laura Igual and Santi Seguí, Springer, e-book.
[2] https://www.kaggle.com/

Note: - This course will be organized on the basis of self-financing. Fees will be decided after the permission from the higher authority.

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

(Erstwhile: Govt. Arts & Science College, Durg)

Examination

1. The question paper for certificate course Classes is to be divided into three Sections – A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions.
3. Section B shall contain short answer type questions with the limit of 150 words.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The scheme of marks should be as follows :

Question Type	MM 70 (Marks x No. of Questions)
A (Very short Answer)	1x30 = 30
B (Short Answer)	3x5 = 15
C (Long Answer)	5x5 = 25

Name and Signatures

V.C. Nominee	Departmental members
Subject Expert	1.H.O.D/ Dr. Jagjeet Kaur Saluja.....
Subject Expert.....	2. Dr.R.S.Singh.....
Alumni (member).....	3. Dr. Anita Shukla.....
Prof. from other Dept. Of Sc. Faculty	4. Mrs. Siteshwari Chandrakar.....
Specialist from Industry.....	5. Dr. Abhishek Kumar Misra.....
	6. Dr. Kusumanjali Deshmukh.....