COURSE HANDOUT

MACHINE LEARNING USING PYTHON (MCA-303)

MCA- 3RD SEMESTER

ACADEMIC YEAR (2024-25)

Ms Arti Kotru

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Department of Computer Applications

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www.mietjmu.in

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
MCA-303	Machine Learning using Python	PCC	4	4	0	2	40	60	100

COURSE OUTCOMES

	At the end of the course the student will be able to:
CO1	Understand the state-of-the-art methods and modern programming tools for data analysis.
CO2	Understand complexity of Machine Learning algorithms and their limitations.
CO3	Understand modern notions in data analysis-oriented computing.
CO4	Implement various packages of python library
CO5	Perform experiments in Machine Learning using real-world data using python.

Section-A

Unit-I
Introduction to Machine Learning Types of machine learning: supervised, unsupervised semi-supervised and reinforcement learning, Steps in the design of learning system, Training and testing, Cross Validation, Feature Reduction/Dimensionality reduction, Performance prediction parameters, and Applications of machine learning.   **(10Hrs)**

Unit-II
Types of Machine Learning Supervised Learning, Labelled data, Classification, and its algorithms: Naive-Bayes classifier, Decision trees, Support vector machines, Principal component analysis: Eigen values, Eigen vectors, Orthogonality, Artificial Neural Networks, and its types. Unsupervised Learning, Unlabeled data, Clustering, and its types: Hierarchical, Fuzzy Density-based, Distance-based, Model-based, K-means clustering, Nearest Neighbor   (**10Hrs)**

Unit-III
Genetic Algorithm and Deep Learning: Introduction, Q learning, Temporal Difference Learning, Learning from Examples, Reward Hypothesis. Genetic algorithm: Introduction, Steps involved in genetic algorithm, Applications of genetic algorithm. Introduction to Deep learning concepts. Tools and Platforms   **(10Hrs)**

Section-B
Unit- lV
Introduction to Python Data Types, variables, and basic Operators. Understanding python blocks and complex data types: Strings, Sequence types: Tuples, named tuples, lists, Set Types: Sets, Frozen sets, Mapping types: dictionaries, iterating and copying collections and arrays Python Program Flow Control Conditional blocks if, else and else if, Simple for loops in python, for loop using ranges, string, list and dictionaries, Exceptions.   **(10Hrs)**

Unit-V
Introduction to Machine Learning using Python and Deep Learning: Classification and Prediction, Text Identification, Introduction to Scikit Learn, Python libraries: Pandas, NumPy, Matplotlib. Introduction to Deep learning concepts. Tools and Platforms (Tensor flow, Keras etc.)   **(10Hrs)**

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Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Machine Learning, "A Probabilistic Perspective"	Kevin Murphy	MIT Press	2nd (2012)
2.	Core Python Programming	R. Nageswara Rao	Dreamtech Press	3rd (2021)

Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Hands-On Machine Learning with Scikit-Learn, Keras, and Tensor Flow	Aurelian Géron	O'Reilly	3rd (2022)

COURSE PLAN	
Unit-I Introduction to Machine Learning	
S.No / **Topics**	**Recommended Books**

S.No	Topics	Recommended Books
1	Types of machine Learning: supervised, unsupervised, semi supervised and reinforcement learning, Steps in the design of learning system, Training, and testing	Book 1, Ch.1
2	Cross Validation	Book (reference)1, Ch.1
3	Feature Reduction/Dimensionality reduction, Performance prediction parameters	Book 1, Ch.1
4	Applications of machine learning and revision	Book 1, Ch.1
Unit-II Types of Machine Learning		
5	Supervised Learning, Labelled data, Classification, and its algorithms: Naive-Bayes classifier	Book (reference)1, Ch.3
6	Decision trees	Book (reference)1, Ch.3
7	Support vector machines	Book (reference)1, Ch.5
8	Principal component analysis: Eigen values, Eigen vectors, Orthogonality, Artificial Neural Networks, and its types	Book (reference)1, Ch.10
9	Unsupervised Learning, Unlabeled data, Clustering, and its types	Book (reference)1, Ch.1
10	Hierarchical, Fuzzy, Density-based, Distance-based, Model-based, K-means clustering, Nearest Neighbor.	Book (reference)1, Ch.1
Unit-III Genetic Algorithm and Deep Learning		
11	Introduction, Q learning, Temporal Difference Learning, Learning from Examples, Reward Hypothesis	Book (reference)1, Ch.16
12	Genetic algorithm: Introduction, Steps involved in genetic algorithm, Applications of genetic algorithm	https://www.youtube.com/watch?v=THSNf9mPsmA
13	Introduction to Deep learning concepts. Tools and Platforms	Book (reference)1, Ch.9
Unit-IV Introduction to Python		

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14	Installing and working with python	https://www.youtube.com/watch?v=OpPStOi-snc
15	Data Types: Identifiers and keywords, integral types, floating-point types, strings	https://www.youtube.com/watch?v=9uh9LU5ZZbs
16	Sequence types Tuples, named tuples, lists, Set Types: Sets, Frozen sets, Mapping types: dictionaries, iterating and copying collections	https://www.youtube.com/watch?v=yLf-soNRNII
17	Control structures: conditional branching, looping, Exception handling: catching and raising exceptions, custom exceptions	https://www.youtube.com/watch?v=1AErcVrLpyQ
Unit-V Introduction to Machine Learning using Python and Deep Learning		
18	Classification and Prediction, Text Identification	https://www.youtube.com/watch?v=X_vaLSqwF28&list=PLtFRWXW-prs-KO78g88D8KnasqBRUB1g-
19	Introduction to Scikit Learn	Book (reference)1, Ch.8
20	Python libraries: Pandas	https://www.youtube.com/watch?v=6DTFIKF8QIg
21	NumPy, Matplotlib	https://www.youtube.com/watch?v=rjY59WLMK2o
22	Introduction to Deep learning concepts. Tools and Platforms (Tensor flow, Keras etc.).	https://www.youtube.com/watch?v=yuVTAZL5BRQ&list=PLyqSpQzTE6M8iQfnwmGhAq7OoSEWnXQRK

ADDITIONAL WEB RESOURCES

1.	**MOOC:** An introductory course on "The Joy of Computing using Python" https://onlinecourses.nptel.ac.in/noc24_cs57/preview
2.	**MOOC :** https://www.coursera.org/browse/data-science/machine-learning
3.	**NPTEL:** Video lectures on Introduction to Machine Learning, Lecture series by Prof. Sudeshna Sarkar, IIT Kharagpur https://nptel.ac.in/courses/106105152

GRADING AND ASSESSMENT

- **Sessional Test**: 20 marks
- **Assignment**: 10 marks
- **Attendance**: 10 marks
- **Final Examination**: 60 marks

COURSE POLICIES

- **Attendance**: Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity**: MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions**: Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

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- **Office Hours**

  Monday (12:55 PM - 1:45 PM)
  Friday (12:55 PM - 1:45 PM)

- **Contact Information**
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