

Course Code	Course Title	L	T	P	C
1152EC154	INTRODUCTION TO MACHINE LEARNING	3	0	0	3

a) Course Category

Program Elective

b) Preamble

Machine learning is the technology of designing and implementing algorithms that allow computers to automatically learn from data or past experience and improve their performance without being explicitly programmed. It forms the basis of artificial intelligence. It involves algorithms to design coding by which computers can decipher information. This course covers the fundamental concepts of machine learning and popular machine learning algorithms, core concepts of supervised learning, unsupervised learning along with hands-on problem solving using simple python programming.

c) Prerequisite

Nil

d) Related Courses

ANN and Deep Learning

e) Course Outcomes

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on Revised Bloom's Taxonomy)
CO1	Explain Machine Learning concepts, classifications of Machine Learning and write simple programs using python.	K2
CO2	Describe Supervised Learning concepts.	K2
CO3	Explain Support Vector Machine concepts.	K2
CO4	Describe unsupervised learning concepts and dimensionality reduction techniques.	K2
CO5	Discuss simple Machine Learning applications in a range of real-world applications using Python programming	K2

f)	Correlation of COs with POs													
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1														
CO 2														
CO 3														
CO 4														
CO 5														

g) Course Content

UNIT I Basics of Machine Learning and Python 9

Review of Linear Algebra, Definition of learning systems; Designing a learning system, Goals and applications of machine learning; Classification of learning system, Basic concepts in Machine Learning.

Python Basics – string, number, list, tuple, Dictionary, functions, conditional statement, Loop statements, Numpy, Matplotlib, simple programming exercises using python.

UNIT II Supervised Learning 9

Linear regression with one variable, Linear regression with multiple variables, Logistic regression; Linear Methods for Classification; Linear Methods for Regression; Decision trees, overfitting.

UNIT III Support Vector Machines 9

Introduction, Maximum Margin Classification, Mathematics behind Maximum Margin Classification, Maximum Margin linear separators, non-linear SVM, Kernels for learning non-linear functions.

UNIT IV Unsupervised Learning 9

Learning from unclassified data, Clustering - Hierarchical Agglomerative Clustering, K-means partitional clustering, Expectation maximization (EM) for soft clustering; Dimensionality reduction – Principal Component Analysis, factor Analysis, Multidimensional scaling, Linear Discriminant Analysis.

UNIT V Applications of Machine Learning 9

Strategies, guidelines for good design, performance measurement, Reading Data, PreProcessing Data, handwriting recognition, object detection, face detection.

Total 45 Hrs

h) Learning Resources

Reference Books

1. EthemAlpaydin, Introduction to Machine Learning, 2nd edition, MIT Press 2010
2. Tom Mitchell, Machine Learning, McGraw-Hill, 1997
3. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective, MIT Press 2012.
4. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements Of Statistical Learning, Second edition Springer 2007.
5. Richert& Coelho, Building Machine Learning Systems with Python

Online Resources

1. AndrewNg, "MachineLearning", StanfordUniversity <https://www.coursera.org/learn/machine-learning/home/info>
2. Sudeshna Sarkar, "Introduction to Machine Learning", IIT Kharagpur. <https://nptel.ac.in/courses/106105152/1>
3. Prof. BalaramanRavindran, "Introduction to Machine Learning", IIT Madras. <https://nptel.ac.in/courses/106106139/1>