COURSE TITLE	**MACHINE LEARNING IN MANUFACTURING**
COURSE CODE	**01CA1123**
COURSE CREDITS	**3**

Objective:

1 To understand the implementation of data mining in manufacturing

Course Outcomes: After completion of this course, student will be able to:

1 Analyze data and its structures in manufacturing applications for effective utilization.
2 Analyze the role and impact of data analytics in manufacturing systems.
3 Demonstrate data collection and data processing techniques for manufacturing data.
4 Select appropriate prediction techniques for analyzing manufacturing data.
5 Propose suitable diagnostic approaches for manufacturing problem analysis.

Pre-requisite of course: Basic concept of linear algebra, calculus, probability, Manufacturing Processes

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**Introduction to Data Analytics in Manufacturing** Define data, Type of data, Importance of data in manufacturing, Use of data in manufacturing, Concept of data analyst, Various application of data analyst in manufacturing.	6
2	**Data Collection and Processing of Data** Various approach of data collection, Reduction in data, Processing of data, Selection of variables/parameters, Concept of principal component analysis, Factor analysis, Case study on any of above methods	10
3	**Prediction Techniques** Type of data set, Selection of prediction technique, Different techniques for prediction, Artificial neural network, Controlling parameter of ANN, Selection of ANN, Various algorithm, Back propagation, Momentum learning algorithm, Levenberg-Marqurardt algorithm for prediction, Concept of local minima & global minima in ANN, Case study on prediction	10
4	**Diagnosis approaches** Various approaches, Introduction of CART, KNN, Simulated annealing, Genetic Algorithm, Introduction of fuzzy logic in diagnostic, case study on diagnosis	10

Contents : Unit	Topics	Contact Hours
5	**Advances in Manufacturing Data Analytics** Concept of Deep Neural Network, Comparative analysis on ANN, DNN, CNN, RNN, Introduction of V surf, Support vector machine, Bayesian Inference	6
Total Hours		**42**

Textbook :

1 Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall, Morgan Kaufmann, 2011

2 Machine Learning , Tom M. Mitchell, McGraw Hill Education, 2017

References:

1 Data Mining: Methods and Techniques, Data Mining: Methods and Techniques, A.B.M Shawkat Ali , Saleh A. Wasimi, Thomson, 2007

2 TensorFlow Machine Learning Cookbook, TensorFlow Machine Learning Cookbook, Nick McClure , Packt Publishing Limited, 2018

3 Statistics and Data Analysis: From Elementary to Intermediate, Statistics and Data Analysis: From Elementary to Intermediate, Ajit Tamhane , Dorothy Dunlop, ? Pearson, 1999

4 Data Analysis for Physical Scientists: Featuring Excel, Data Analysis for Physical Scientists: Featuring Excel, Les Kirkup , Cambridge University Press, 2012

5 PATTERN RECOGNITION AND MACHINE LEARNING , PATTERN RECOGNITION AND MACHINE LEARNING , Christopher M. Bishop, Springer, 2016

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
5.00	20.00	30.00	30.00	10.00	5.00

Instructional Method:

1 PPT, Videos

2 Mooc course

3 online coding tool

Supplementary Resources:

1 https://www.anaconda.com/

Supplementary Resources:

2 https://www.python.org/

3 https://colab.research.google.com/

4 https://www.iitk.ac.in/ee/data-mining-lab/