

### PROFORMA FOR MODIFIED COURSE

1.	Title of the course	Machine Learning
2.	Course number	CS3109/CS5103
3.	Status of the course	Core/Elective
4.	Structure of credits	3-0-0-3
5.	Offered to	UG
6.	New course/modification to	Modification to CS3109
7.	To be offered by	Department of Computer Science and Engineering
8.	To take effect from	July 2020
9.	Prerequisite	CoT
10.	Whether approved by the Department	Yes
11.	<b>Course Objective(s):</b> To impart knowledge on core concepts in machine learning. To impart a skill on data science way of problem formulation, data representation, processing and inference. To impart knowledge on standard practices via diverse application scenarios and hands-on exercises.	
12.	<b>Course Content:</b> Review of basic concepts in python, vector algebra, multivariate calculus, random variables, probability distributions and statistical metrics; Supervised learning algorithms: vector representation, linear regression, logistic regression, evaluation metrics, bias-variance, cross validation, regularization, decision tree and ensembles and support vector machines; Practical modeling aspects: class imbalance, missing values, noise, batch processing, data seasonality; Artificial neural networks: backpropagation, activation functions and principles of deep networks; Unsupervised learning algorithms: clustering, principal component analysis and data visualization; Hands-on exercises on pertinent software platforms for various application scenarios.	
13.	<b>Textbook(s):</b> 1. Geron A, <i>Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems</i> , 1st Edition, Shroff/O' Reilly (2017). 2. Shalev-Shwartz S and Ben-David S, <i>Understanding Machine Learning: From Theory to Algorithms</i> , 1st Edition, Cambridge University Press (2014).	
14.	<b>Reference(s):</b> 1. Abu-Mostafa Y S, Magdon-Ismael M and Lin H T, <i>Learning from Data: A Short Course</i> , 1st Edition, AMLBook (2012). 2. Goodfellow I, Bengio Y and Courville A, <i>Deep Learning</i> , 1st Edition, MIT Press (2017). 3. Rumelhart D E and McClelland J L, <i>Parallel and Distributed Processing: A Handbook of Models</i> , 1st Edition, MIT Press (1989).	