

1.	Title of the course	Machine Learning in Mechanics
2.	Course number	ME607L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To ME6026/19
6.	To be offered by	Department of Mechanical Engineering
7.	To take effect from	January 2022
8.	Prerequisite	CoT
9.	Course Objective(s): To introduce machine learning techniques, discuss the different classes of algorithms and their applications for a range of problems in mechanics.	
10.	Course Content: Mathematical preliminaries: linear algebra, probability and optimization; Supervised machine learning: regression and classification; machine learning algorithms: linear and logistic regression, decision trees, support vector machines, random forest, gradient boosting techniques; Neural networks: multilayer perceptron, backpropagation, convolutional neural networks, introduction to deep learning; Case studies: part classification, quality control, performance prediction, optimization of production processes, condition monitoring, mechanical property prediction, design optimization - identify patterns in data, input/output mapping, synthesizing solutions.	
11.	Textbook(s): 1. Deisenroth M P, Faisal A A and Ong C S, <i>Mathematics for Machine Learning</i> , 1st Edition, Cambridge University Press (2020). 2. Kollmannsberger S S, Angella D, Jokeit M and Herrmann L, <i>Deep Learning in Computational Mechanics</i> , 1st Edition, Springer (2021).	
12.	Reference(s): 1. Aggarwal C C, <i>Linear Algebra and Optimization for Machine Learning</i> , 1st Edition, Springer (2020). 2. Geron A, <i>Hands On Machine Learning with Scikit-Learn, Keras and Tensor Flow: Concepts, Tools and Techniques to Build Intelligent Systems</i> , 2nd Edition, Shroff (2016). 3. Goodfellow I, <i>Deep Learning</i> , 1st Edition, MIT Press (2016). 4. Yagawa G and Oishi A, <i>Computational Mechanics with Neural Networks</i> , 1st Edition, Springer (2021).	