

1.	Title of the course	Data Stream Analytics
2.	Course number	CS5226
3.	Status of the course	Elective
4.	Structure of credits	3-0-0-3
5.	Offered to	PG
6.	New course/modification to	New course
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.	Course Objective(s): To impart knowledge on theoretical concepts and practical processes in analysis of streams of data. To impart knowledge on standard practices via industrial case studies and self-help exercises over state of the art software platforms.	
12.	Course Content: Time-series analysis: modelling using stochastic processes, stationarity, autocovariance function, autocorrelation, partial autocorrelation function; Classical approaches: AutoRegressive (AR), Moving Average (MA), integrated models, mixed models, seasonality, exogenous regressors, vector models, Akaike Information Criterion (AIC) for order selection, exponential smoothing; Spectral analysis; State space modeling of time series: Hidden Markov Model (HMM), Kalman filtering, nonlinear and multivariate time series analysis; Usage of deep learning: Multilayer Perceptron (MLP), Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTM), Convolutional Neural Networks (CNN), auto encoder, hybrids; Industrial case studies: anomaly detection, forecasting, multi length time series data, extreme value prediction, incremental learning in time series.	
13.	Textbook(s): 1. Prakash P and Avishek P, <i>Practical Time-Series Analysis</i> , 1st Edition, Ingram short title (2017). 2. Shumway R and Stoffe D, <i>Time Series Analysis and its Applications</i> , 4th Edition, Springer (2016).	
14.	Reference(s): 1. Brownlee J, <i>Introduction to Time Series Forecasting With Python: How to Prepare Data and Develop Models to Predict the Future</i> , 1st Edition, Machine Learning Mastery (2019). 2. Brownlee J, <i>Deep Learning for Time Series Forecasting</i> , 1st Edition, Machine Learning Mastery (2019). 3. Hyndman R and Athanasopoulos G, <i>Forecasting: principles and practice</i> , 2nd Edition, OTexts (2018). 4. Nielsen A, <i>Practical Time Series Analysis: Prediction with Statistics and Machine Learning</i> , 1st Edition, O'Reilly (2019).	