



**NATIONAL INSTITUTE OF
INDUSTRIAL ENGINEERING, MUMBAI**

(An Autonomous body under MoE, Govt. of India)

Presents

**Management Development
Program**

***Financial Analytics with
Time Series Modeling and
Neural Networks using
Python***

Date: 6th Feb- 20th Feb, 2021
(5 weekends)

Duration: 5 classes
3hrs per class

Deliver: Web based sessions
(Zoom / MS Teams / Webex)

Course Coordinator:

Prof. Ajaya Kumar Panda

Prof. Rakesh Verma

Registration Link : tinyurl.com/yxb28ybn

Introduction:

The field of financial econometrics using advanced tools and techniques has emerged over the last decade. The intention of this course is to help practitioners cut through the vast literature on financial time series models, focusing on the most important and useful empirical concepts. This course is expected to develop a sound background in quantitative analysis of financial time series. It also aims to develop sound understanding in sequential data analysis by building a Long Short-term memory model (LSTM) of Neural Network. It offers a guide to analyse and model time series properties of financial data using machine learning approach through Python. The course is designed for researchers and practitioners in the finance industry. Our aim is to provide a road map from academic prospective to the research issues that are important for researchers and practitioners.

Objectives:

This short course aims to discuss a broader aspect of time series modelling on financial data with advanced tools and techniques. It covers applied econometric tools relating to univariate financial time series models and LSTM using Python. The course aims to develop insights of financial models with univariate time series analysis and neural networks models using stock market indices.

Learning Outcomes:

After completion of the course, participants would be able to:

- Understand Time Series and Neural network properties of Financial data
- Theoretical and empirical implications of Financial Time series
- Univariate Time series modeling and forecasting.
- Advanced research in LSTM

Course Content:

1. Fundamentals of Financial Time series
 - a) Visualization of Time series data
 - b) Autocorrelation functions and testing of stationarity of financial data
 - c) Moving averages and time series smoothers
2. Univariate Time series modeling
 - a) Introduction to ARIMA
 - b) Building ARIMA model and forecasting market returns
 - c) Modeling using ARIMAX
3. Modeling return volatility
 - a) Autoregressive Conditional Heteroskedasticity (ARCH) modeling of market return.
 - b) Generalized Autoregressive Conditional Heteroskedasticity (GARCH) modeling of market return.
4. Understanding Financial Time Series and Neural network
 - a) Understanding Neural network
 - b) AI Neural Network in financial Data
 - c) Recurrence Neural Network (RNN) and its advantage and disadvantage
 - d) Long Short-term Memory Model (LSTM)

Prerequisites

- Personal computer with Python (we will be using Google Colab.)
- Basic knowledge of statistics and time series is expected
- Basic understanding of Python is expected to install packages/library
- However, the course is design in such a way that participants with little knowledge in statistics and zero knowledge in computer language like Python can easily manage to learn financial time series modelling in this course

Course Coordinators:

Dr. Ajaya Kumar Panda
Assistant Professor (Finance)
(Finance and Economics Area)

Prof. Rakesh Verma
Associate Professor
(Analytics and Data Science Area)

