

171003K06

Advanced Mathematical Methods for Real Data Analysis: from Partial Differential Equations approach to Time Series Modelling

Overview

Today there is a greater need of new methodologies for analyzing real data arising from Industries. This course is first of its kind combining two different approaches for effective real data analysis: PDE and Time Series Modelling. During the course students will have the opportunity to explore modern PDE tools (conservation laws, diffusion process, reaction-diffusion process, shocks, Sobolov spaces and numerics) & combining nicely to the time series modelling. The course will be a travel on PDE eye on the data combined with Time Series. Simultaneously the students will have an opportunity to learn of new methods of time series analysis. First the classical time series models will be introduced, then the extensions of known systems will be presented. There will be classical ARMA, ARIMA, SARIMA and PARMA models with Gaussian distribution. However because the Gaussian-based models are inappropriate for many real phenomena, the non-Gaussian systems will be introduced. The special attention will be paid to models based on the heavy-tailed (especially stable) distributions. The heavy-tailed distributions have found many practical applications and latest methods based on heavy-tailed distribution for the rigor analysis will be discussed. The estimation and simulation methods for time series models will be introduced. The students will have the opportunity to check those methods by using MATLAB codes. Moreover, the real applications will be presented and the estimation and simulation methods will be used for real phenomena. The real applications by using time series models will be related to financial markets as well as the mining industry. The novelty of the course is lying on the combination of approaches used in real data modelling. During the regular university courses students have opportunity to learn only one kind of methods: deterministic or stochastic-based. In this course the spectrum of the proposed methods and models will be wider. Moreover the real phenomena applications can raise the interest of participants in the area of such effective mathematical models.

Course participants will learn above mentioned topics through lectures and hands-on experiments by using MATLAB.

Modules	One Week Module: March 5th - March 10th, 2018. Number of participants for the course will be limited to Fifty.
You Should Attend If...	<ul style="list-style-type: none"> • You are executive, engineer or researcher from manufacturing, service and government organizations including R&D laboratories. • You are student at all levels (BTech/MSc/MTech/PhD) or faculty from reputed academic institutions and technical institutions.
Fees	<p>The participation fees for taking the course is as follows:</p> <p>Participants from abroad : US \$200. Industry/ Research Organizations: Rs. 8000. Academic Institutions: Faculty: Rs. 5000, Students: Rs. 2500.</p> <p>Mode of Payment: ONLINE TRANSFER Account Name: CCE IIT Madras Acc. No.: 36401111110 Branch: SBI, IIT Madras Branch, Chennai IFSC Code: SBIN0001055 SWIFT: SBININBB453</p> <p>The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.</p>

**Course
Co-ordinator**
Prof. S. Sundar

IIT MADRAS

Phone: +91-44-
22574618 /
+919840206911

E-mail:
slnt@iitm.ac.in

The Faculty



Prof. Agnieszka Wyłomańska is in the Faculty of Pure and Applied Mathematics at the Wrocław University of Technology, Poland. Her research interests include time series analysis, stochastic modelling and statistical analysis of real data (especially technical data related to mining industry, indoor air quality and financial time series).



Prof. S. Sundar is presently the Head, Department of Mathematics, IIT Madras. His research area includes PDE Modeling and Numerical Simulation. He is a Member of Program Advisory Committee (Mathematical Sciences), DST – SERB, Government of India and also a Member of the Faculty Council, IIT Madras Research Park.