

**Centre for Mathematical Sciences (CMS)
Apaji Institute of Mathematics & Applied Computer Technology
Banasthali University**

**SEMINAR
ON
TIME SERIES MODELING
October 03-06, 2009**

Report

PROGRAM SCHEDULE

Advisory Committee : Prof. Aditya Shastri, Vice-chancellor, Banasthali University, Prof. Umesh Singh, Coordinator CIMS B.H.U. Varanasi, Prof. B. K. Das, Delhi University, Prof. S.B. Rao, CR- Rao institute Hyderabad, Dr. A.K. Singh, DST New Delhi.

Convener Prof.G.N.Purohit

Coordinator : Dr. Sarla Pareek

Organising Committee : Dr.Deepa Sinha, Dr.Shalini Chandra, Mr. Piyush Kant Rai

Objective: Time Series Modeling is one of the most active fields of current research in Statistics. Practitioners and researchers in Engineering, Physical, Biological, Economic, Natural and Social Sciences are all concerned with the analysis of a sequence of observed data. The great advantage of time series analysis is the possibility for both explaining the past and predicting the future behavior of variable of interest. Thus the history of time series is called on to do double duty: "One, it must inform us about the particular mechanism which describes the evolution through time and it allows us to put that mechanism to use in forecasting the future." Once the pattern is established, we can interpret and extrapolate the identified pattern to predict future events. Though, substantial amount of interdisciplinary research work is going in this field, however few areas are still need to be explored.

The main objective of the seminar was to train students, research scholars and teachers and to give exposure in Time Series Modeling and Computer/Empirical analysis.

1. **Faculty:** The seminar had eminent experts in the field of Time series modeling . The number of experts from the field were contacted out of which following four consented to be the visiting faculty in the same.
 - Prof.Nityanand Sarkar, ISI Kolkata
 - Prof. G.K.Basak, ISI Kolkata
 - Prof.Samarjit Das, ISI Kolkata
 - Prof. Atanu Biswas, ISI Kolkata
2. **Participants:** Participation was invited from the North West region of the country by sending invitation to the Heads of the Departments of Statistics/ Mathematics/Computer Science/Economics of various Institutes/ Universities and Research Organizations and also announcing the workshop on the website of Banasthali University www.banasthali.org. The applications received were scrutinized by the committee and shortlisted based on the relevance of the area of specialization with their research interest. The application of fifty candidates from all over India had been received and thirty-five candidates were shortlisted and invited. Thirty-one candidates participated in the seminar. In addition to this, faculty members from Banasthali Vidyapith also participated.
3. **Programme:** The programme was comprised of theory sessions in addition to inaugural and valedictory session. The program copy given below gives the detail of the sessions:

**Centre for Mathematical Sciences (CMS)
Apaji Institute of Mathematics & Applied Computer Technology
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***Seminar
on
Time Series Modeling
(3-6, Oct, 2009)***

PROGRAM SCHEDULE

Registration : Oct. 03, 2008, 8.30 am–9:30 am
Inaugural Session : Oct. 03, 2008, 9:30 am, CMS 103
Venue for lectures : CMS 103
3:00 pm (Tea)

Sessions Date	I : Lecture 10.00 am- 11.00am		II : Lecture 11.30 am- 12. 30pm		III : Lecture 2.00 pm-3.00 pm	IV : Lecture 3 :30 pm- 4 :30 pm	V : Lecture 4.30 pm - 5.30 pm
Oct. 03, 2008	10:30-11:30am NS	A E T	12:00-1:00 pm NS	L U N C H	2:00-3:30 NS	NS	Banasthali Visit
Oct.04, 2008	NS		NS		GKB	GKB	GKB
Oct. 05, 2008	AB		AB		AB	SD	SD
Oct. 06, 2008	9:00-10:00 GKB CMS auditorium		10:30-11:30 NS CMS auditorium		Valedictory session before lunch CMS 103		

NS- Prof. Nityanand Sarkar, ISI Kolkata

GKB- Prof. G.K.Basak, ISI Kolkata

AB- Prof. Atanu Biswas, ISI Kolkata

SD- Prof. Samarjit Das, ISI Kolkata

Topics to be covered:

1. Exploratory Analysis of Time Series
2. Testing for Stationarity
3. Modelling of Univariate Stationary Time Series
4. Estimation and Diagnostic Tests
5. Forecasting Based on Stationary Models
6. Discrete-Valued Time Series
7. Volatility Models
8. Multivariate Time Series Modelling

Report of the Program:

- **Inaugural Session:** The inaugural session was attended by more than 100 members which included speakers, participants, research scholars, students of M.Sc. Mathematical Sciences, Apaji Institute and the Deans of various faculties, Heads of Departments and other distinguish faculty members of the University.

Prof. Nityanand Sarkar, ISI Kolkata inaugurated the seminar by lightning the lamp. He has thrown light on the topic of the seminar by highlighting the problems associated with modeling of time series data in various fields and its applications. Prof.Chitra Purohit, Secretary Banasthali University has given her blessings for the success of the seminar. Dr. Sarla Pareek, coordinator of the seminar, has motivated all the participants to learn new ideas and thoughts to be discuss in the seminar. She discussed the objectives of CMS in Banasthali University and suggested all the participants to discuss their problems at open platform provided under the activities of CMS, not only in the seminar but also from their places after the completion of the same. Dr. Shalini Chandra, organizer of the seminar, has given the introduction of the seminar to the participants and also discussed the objective of conducting such an extensive programme. The session ended with the vote of thanks given by Mr. P.K. Rai to all associated persons and especially to the Department of Science and Technology, for giving the opportunity to hold this seminar.

Lecture Sessions:

- The first speaker Prof. Nityanand Sarkar has started with the basics of time series modeling like definition of time series, time series plots, finding out trends and seasonality, their removal from the time series to make it stationary. He discussed the concept of Unit root tests including Dickey Fuller test, Philips Perron test, Augmented Dickey Fuller test. He also talked about the Cointegration by which two or more nonstationary series can be made stationary by suitable choice of cointegrating matrix.
- Prof. G.K.Basak delivered lectures on concepts of time series modeling with the help of empirical data analysis using R software. His approach of theory with applications was much appealing to the participants. He talked about the fitting of time series models like AR, MA, ARMA, ARIMA and their diagnostic checking.
- Prof. Atanu Biswas delivered lectures on the estimation of parameters in the time series models. He started with the estimation of the discrete valued time series models assuming errors in the model having poisson distribution and moved to the estimation of continous time series models.

- Prof. Samarjit Das talked about the volatility in the time series models. He discussed about the ARCH models, which captures the volatility in the series. He also talked about the estimation of the ARCH models and its applications in Indian Economy.

- **Valedictory Session:**

Beginning with the coordinator, Dr. Sarla Pareek giving a brief of the proceedings and seminar statistics, the session had expressions and feelings from both the experts and the participants. Prof. G.N.Purohit, Honorary professor in Mathematics, Banasthali University expressed his satisfaction on the arrangements of the seminar and cooperation from the participants from outside instrumental in the success of the academic activity. Prof. Nityanand Sarkar, ISI Kolkata has marked this event in the series of top class event of time series modeling in the country. He appreciated the fact that Banasthali University enthusiastically participate in research activities necessary for the promotion of research in Mathematical Sciences. Four of the participants presented their views on behalf of all, where they expressed that the quality of all the lectures were par excellence and they have learnt a lot regarding this new paradigm and uses of R software in this seminar.

Prof. Aditya Shastri, Vice Chacellor, Banasthali University has given his blessings to all the participants and congratulated all on the grand success of the seminar.

At last, Dr. Shalini Chandra on behalf of organizing committee thanked the University staff, DST and the support system for making the organization of seminar smooth, a key factor in the success of the event.

- **Lecture notes:** The hard copy as well as soft copy of the lecture notes given by the experts has been provided to the participants.
- **Conclusion:** The seminar, sponsored by DST, under CMS had very positive outcomes as follows:
 1. It has given a chance to the faculty and students to interact with the distinguished experts from the field of Time series modeling.
 2. It established the fact that Centre for Mathematical Sciences, Banasthali University hold larger activities for the promotion of research in Mathematical Sciences thereby providing a platform for the researchers. It introduced and exposed the participants to the range of support for various academic initiatives by DST.