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| 1. | Title of the course | Stochastic Processes and Time Series Analysis |
| 2. | Course number | MA509L |
| 3. | Structure of credits | 3-0-0-3 |
| 4. | Offered to | PG |
| 5. | New course/modification to | Modification To MA5210/7 |
| 6. | To be offered by | Department of Mathematics and Statistics |
| 7. | To take effect from | July 2022 |
| 8. | Prerequisite | Nil |
| 9. | **Course Objective(s):** To introduce discrete and continuous time stochastic processes such as Markov chains, random walks, Poisson process, branching process, and different time series processes. To make Statistical models using these Stochastic Processes and implement the methods for analyzing data. | |
| 10. | **Course Content:** Stochastic Process Definitions, Discrete-Time Markov Chain, Limiting Stationary Distributions, Poisson and Pure Birth Processes, Renewal Process, Branching Process. Linear Models (Auto Regression Moving Average (ARMA), Seasonal Auto Regression Integrated Moving Average (SARIMA) etc.), Nonlinear Models (Threshold Auto-Regressive (TAR), Smooth Transition AutoRegressive (STAR) etc.), Conditional Models (AutoRegressive Conditional Heteroskedasticity (ARCH), Generalized ARCH (GARCH), Exponential GARCH etc.), Multivariate Models (Vector AutoRegressive (VAR), Vector Moving Average (VMA) etc.), Long Memory Models (Auto Regression Fractionally Integrated Moving Average (ARFIMA) ), State Space Models, Forecasting. | |
| 11. | **Textbook(s):**<br>1. Karlin S, and Taylor H M, First Course in Stochastic Processes, Academic Press (1975).<br>2. Shumway R, and Stoffer D, *Time Series Analysis and its application*, Springer (2000). | |
| 12. | **Reference(s):**<br>1. Say R T, *Analysis of financial Time series*, Wiley (2001).<br>2. Ross S M, *Stochastic Processes*, JohnWiley (1983). | |