

IND 2617 TIME SERIES

TOTAL HOURS: 45 HOURS

CREDITS: 3 / CRITERIA 12

REQUIREMENT(S):

GOALS Enable graduate students to analyze, model, forecast and simulate Time Series.

SYLLABUS The basic steps in a forecasting task. Decomposition and identification methods. Trend and Seasonality modelling. Exponential Smoothing Methods. ARIMA models. Simple and Multiple Regression. Advanced forecasting methods. Computational applications.

PROGRAM Preliminary concepts. Mathematical notation, theoretical assumptions and the main statistical tests in Time Series. Data analysis and visualization. Decomposition, transformations and adjustments. Trend and seasonality modelling. Exponential Smoothing Methods: simple, Holt's linear, exponential and damped trends, Holt-Winters seasonal, taxonomy and innovations space state models. ARIMA models: stationarity and differencing, backshift notation, autoregressive models, moving average models, non-seasonal ARIMA models, estimation and order selection, forecasting, seasonal ARIMA models. Regression models: formulation, selection, estimation, forecasting and analysis. Advanced forecasting methods: transfer functions, dynamic regression models, hierarchical time series, clustering and simulations, *Singular Spectrum Analysis*. Computational applications.

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Morettin, P. A.; Toloi, C. M. *Análise de Séries Temporais*. 2ª Ed. São Paulo: Edgard Blucher. 2006.

Shumway, R. H.; Stoffer, D. S. *Time Series Analysis and Its Applications: With R Examples*. Springer; 3rd ed. 2011.

Souza, R. C.; Camargo, M. E. *Análise e Previsão de Séries Temporais: Os Modelos Arima*. 2a. ed. Rio de Janeiro: Gráfica e Editora Reginal, 2004.

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