Math 328 Time Series Analysis. 3 credits

This course discusses the basic concepts and methodologies related to linear time series data. Math 328 is cross listed with Finance department course Fin 328. Prerequisites for Math/Fin 328 is Math 238 (Linear Algebra with Differential Equations) and Math 318 (Introduction to Probability and Statistics).

Math 328 is an elective course for statistics major and minor students.

1. Time series probabilistic properties
    (a) Stationarity.
    (b) Invertibility.
    (c) Parameters (autocovariance, autocorrelation, and spectral density function).

2. Stationary time series models
    (a) White noise process.
    (b) Autoregressive process of order p.
    (c) Moving average process of order q.
    (d) Autoregressive moving average process of orders p and q.

3. Nonstationary time series models
    (a) Nonstationarity in the mean
    (b) Autoregressive integrated moving average process of orders p, d, and q.
    (c) Nonstationarity in the variance and autocovariance
    (d) Variance stabilizing transformations

4. Forecasting
    (a) Forecasting methods – qualitative versus quantitative methods.
    (b) Quantitative forecasting methods – time series regression, classical decomposition, exponential smoothing.
    (c) Measuring forecast errors.

5. Regression analysis
    (a) Simple linear regression.
    (b) Multiple linear regression.
    (c) Residual analysis.

6. Trend and seasonality
    (a) Trend functions – linear, quadratic, and polynomial.
    (b) Seasonal component – trigonometric functions.

7. Model identification
    (a) Steps of Model identification
    (b) Parameter estimation