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OFFICIAL SYLLABUS
STAT 478 – Time Series Analysis
(Adopted Spring 2011; Committee: Drs. A. Neath and S. Rigdon)

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Catalog Description: Statistical analysis of time series. Regression and exponential smoothing. Box- Jenkins methodology. Prerequisites: 380 or 480b with grades of C or better.

Textbook: Douglas C. Montgomery, Cheryl L. Jennings, and Murat Kulachi (2008) *Introduction to Time Series Analysis and Forecasting* Wiley: New York. **ISBN-10:** 0471653977, **ISBN-13:** 978-0471653974

Student Solutions Manual to Accompany Time Series Analysis and Forecasting, **ISBN-10:** 0470435747, **ISBN-13:** 978-0470435748

Course Outline and Topics:

Chapter 2 – Statistics Background for Forecasting
        2.1 Introduction
        2.2 Graphical Displays
        2.3 Numerical Description of Time Series Data (stationarity, autocovariance, autocorrelation)
        2.4 Use of Data Transformations and Adjustments
        2.5 General Approach to Time Series Modeling and Forecasting
        2.6 Evaluation and Monitoring Forecasting Model Performance

Chapter 3 – Regression Analysis and Forecasting
        3.1 Introduction
        3.2 Least Squares Estimation in Linear Regression
        3.3 Statistical Inference In Linear Regression
        3.4 Prediction of New Observations
        3.5* Model Adequacy Checking
        3.6* Variable Selection Methods in Regression
        3.7 Generalized and Weighted Least Squares
        3.8 Regression Models for General Time Series Data

Chapter 4 – Exponential Smoothing Methods
        4.1 Introduction
        4.2 First-Order Smoothing
        4.3 Modeling Time Series Data
        4.4 Second-Order Exponential Smoothing
        4.5 Higher-Order Exponential Smoothing
        4.6 Forecasting
        4.7 Exponential Smoothing for Seasonal Data
        4.8 Exponential Smoothers and ARIMA Models

Chapter 5 – Autoregressive Integrated Moving Average (ARIMA) Models
        5.1 Introduction
        5.2 Linear Models for Stationary Time Series
        5.3 Finite Order Moving Average Processes
        5.4 Finite Order Autoregressive Processes
        5.5 Mixed Autoregressive – Moving Average (ARMA)
        5.6 Nonstationary Processes
        5.7 Time Series Model Building
        5.8 Forecasting ARIMA Processes
        5.9 Seasonal Processes
        5.10 Final Comments

Chapter 7* – Survey of Other Forecasting Methods (Optional)
        7.1* Multivariate Time Series Models and Forecasting
        7.2* State Space Models

Any instructor should cover all of the material specified, except the starred sections (gray font) which are optional.