**Economics 240: Quantitative Analysis and Forecasting**

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Office Hours: Wed 10AM-1 PM and by appointment

Thursday 9AM – 11AM

**Textbook, Software, and Data Bases**

1. John E. Hanke and Dean W. Wichern, Business Forecasting, Pearson/Prentice Hall, Ninth Edition, 2009.
2. The MINITAB statistical/forecasting computer program is available free on the Pace Network. Also, it can also be ordered separately on-line for your PC for a six month period (for a fee of approximately $30 directly from MINITAB).
3. The ECONOMAGIC data base which is supplied on the Pace Network and is free.

**Course Objectives**

This course is designed to give students a detailed understanding of the mathematical methodologies associated with economic and financial forecasting. Emphasis is placed on five forms of forecasting: i.e., Regression Analysis, Exponential Smoothing, Time Series Decomposition, Autoregressive Integrated Moving Averaging (ARIMA) models, and Data Mining. Students will also be required to demonstrate competence using the statistical/econometric forecasting programs residing in MINITAB. There is also a brief introduction to the Data Mining computer software programs residing in SAS Enterprise Miner 5.3 and XLMiner which is an EXCEL add-in. Data bases, in particular ECONMAGIC, are also explored in detail.

At the conclusion of the course students are expected to:

1. Understand forecasting theories as they relate to current economic/financial issues.
2. To evaluate economic issues from a variety of different forecasting perspectives.
3. To critically evaluate different research methodologies with regards to current forecasting problems.
4. To demonstrate critical analytical and thinking skills as they relate to forecasting issues.
5. Be able to evaluate forecasting issues from both a global as well as a national perspective.
6. To demonstrate competence in several econometric/forecasting computer packages such as MINITAB, SAS, SAS Enterprise Miner 6.2, and XLMiner.
7. To demonstrate competence in handling data bases such as ECONOMAGIC as applied to forecasting issues.

As partial fulfillment towards receiving credit for the course, students must sit for two examinations; a midterm and final. Each of these examinations is worth 25 points. In addition, subject to the instructors’ approval, students are required to submit a 5-10 page research paper that demonstrates to the instructor a measure of competence in the forecasting area. The topic of the paper should be in a specific area of forecasting and it is worth an additional 25 points. Homework assignments located in the “Assignments’ folder in Blackboard count for 25% of the final mark.

Students are expected to attend and participate in class. Homework is assigned, required and reviewed in class and is an integral part of the course. The homework is found under the ‘*ASSIGNMENTS*’ menu located in your BLACKBOARD account. **All homework must be submitted to your folder on the date and time specified in the ‘Assignment’ folder. It cannot be emphasized enough that under any circumstances late submissions will not be allowed.** Students are strongly advised that this course requires an intensive amount of preparation that is most readily grasped in a classroom environment. If you miss a class or a computer workshop the covered material is your responsibility.

**SUMMARY OF COURSE REQUIREMENTS**

Mid-term Examination 25%

Final Examination ` 25%

WEB-BASED Homework Assignments 25%

Final Paper 25%

**Course Outline**

**Topic 1: Statistical Review and an Introduction to Forecasting**

*Chapters 1-3*

A brief review of the statistical concepts and graphical techniques used in class. An exploration of data patterns and overview of forecasting techniques. Forecasting through the use of regression analysis is developed. A brief introduction to MINITAB and ECONOMAGIC is covered in this section and data sets are supplied.

**Topic 2: Statistical Review and an Introduction to Regression Analysis**

*Chapter 6*

A brief review of the statistical concepts used in class. The important univariate statistics are the t-test and the F-test (i.e., ANOVA). Bi-variate regression is introduced by estimating coefficients using Ordinary Least Squares. Hypothesis testing, confidence intervals, *p*-values, and goodness of fit measures are reviewed. Forecasting through the use of regression analysis is developed. Functional form or non linearity in the variables is covered. Advanced demonstrations of MINITAB and ECONOMAGIC.

**Topic 3: Multiple Regressions and Forecasting**

*Chapters 7*

The multiple regression model is estimated and interpreted. Multicollinearity is addressed by investigating its causes, consequences, tests-to-detect, and correction procedures. Dichotomous or Dummy Variables are examined. Point and interval forecasts are developed as are *ex post* and *ex anti* forecasting procedures. Forecasts are evaluated using conventional statistical tests (i.e., root mean square error, Theil’s inequality coefficient, etc.) Several economic/financial applications with regard to forecasting are introduced. Advanced demonstrations of MINITAB and ECONOMAGIC.

**Topic 4: Time Series Data and Associated Forecasting Problems in Regression Analysis**

*Chapter 8*

Single equation regression problems associated with time series data such as autocorrelation and heteroscedasticity are covered in detail. The approach here is to first identify the cause of the problem, then discuss the consequences, develop a test statistic to detect the problem, and finally come up with a correction procedure to remedy it. Point and interval forecasts are developed as are *ex post* and *ex anti* forecasting procedures. Forecasts are evaluated using conventional statistical tests (i.e., root mean square error, Theil’s inequality coefficient, etc.) Several economic/financial applications with regard to forecasting are introduced. Advanced demonstrations of MINITAB and ECONOMAGIC.

**Topic 5: Introduction to Time Series Models**

*Chapters 4-5*

Moving Averages and Exponential Smoothing methods are introduced. Decomposing time series data into trends, cycles, and seasonality’s are discussed. Advanced demonstrations of MINITAB and ECONOMAGIC are covered.

**Topic 6: Time Series Models**

*Chapters 4,5, 9*

Moving Averages and Exponential Smoothing methods are introduced. Decomposing time series data into trends, cycles, and seasonality’s are discussed. Re-visit exponential smoothing and forecasting. Autoregressive Integrated Moving Averaging (ARIMA) models are reviewed. The Box-Jenkins method of model estimation, diagnostic checking, and forecasting are presented and evaluated. Combinations of regression and ARIMA (i.e., transfer functions) are explored. Comprehensive economic/financial models are developed using these methodologies. More advanced demonstrations of MINITAB and ECONOMAGIC are offered.

**Topic 7: Data/Text Mining and Forecasting**

Handout on Blackboard (Ereserves)

A brief introduction on Data and Text Mining and its applications to forecasting issues. Three techniques of Data Mining are introduced—Classification Trees, Regression Trees, and Neural Networks. Examples are drawn from bank fraud, financial forecasting, student retention rates, and stylography, etc. A brief introduction to Data and Text Mining computer software in SAS Enterprise Miner 6.2 is introduced.

**Topic 8: Current Issues in Forecasting**

Topical issues are discussed and tailored toward specific interests of the student. The topics are selected in accordance with the research interests of the student.

**Quality of Homework Assignments**

You will receive a grade for each of the Homework assignments and what follows is a brief description of exactly how you are graded. In either case you must submit your assignments on time in order to receive credit.

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**Other Important Information.**

Students must accept the responsibility to be honest and to respect ethical standards in meeting their academic assignments and requirements. Integrity in the academic life requires that students demonstrate intellectual and academic achievement independent of all assistance except that authorized by the instructor. The use of an outside source in any paper, report or submission for academic credit without the appropriate acknowledgment is *plagiarism*. It is unethical to present as one’s own work, the ideas, words or representations of another without the proper indication of the source. *Therefore, it is the student’s responsibility to give credit for any quotation, idea or data borrowed from an outside source.*

Students who fail to meet the responsibility for academic integrity subject themselves to sanctions ranging from a reduction in grade or failure in the assignment or course in which the offense occurred to suspension or dismissal from the University. Students penalized for failing to maintain academic integrity who wish to appeal such action may petition the department chair to request a hearing on the matter.

Pace University believes that it is important that students receive appropriate accommodation for any disability. If you have a disability for which you are or may be requesting an academic accommodation, you must register with the Coordinator of Services for Students with Disabilities. Trained professional Counselors will:

-Evaluate your medical documentation;

-Conduct appropriate tests or refer you for same;

-Make recommendations for your plan of accommodation; and

-Contact your professors (with your permission) to arrange for the

recommended accommodations.

Your professor is not authorized to provide any accommodation prior to you arranging for same through the Counseling/Personal Development Center. If you have, or believe you have, a disability, be sure to follow the above procedure.