

**University of Piraeus**  
**Department of Economics**  
**Master of Economic and Business Strategy**

**Business Statistics**  
**(Ποσοτικές Μέθοδοι για Οικονομικές Αποφάσεις)**

Fall Semester 2024

**Instructor Information:**

**Christos Agiakloglou**

Professor

**Office:** 527 - Department of Economics (5<sup>th</sup> Floor)

**Office Hours:** Wednesday 4-5 p.m. (or by appointment)

**Tel:** 210-414-2290    **E-mail:** agiaklis@unipi.gr

**Course Description**

The current course will provide a thorough presentation of quantitative methods used in Economics/Finance to empirically identify the behavior of many economic/financial issues. Indeed, every economic/financial issue consists of two major parts: a) the theoretical and b) the empirical part. The theoretical part describes how the phenomenon is expected to behave, whereas the empirical part tries to verify its behavior in practice using real data. Clearly, every part has its role and its contribution in Economics/Finance, but without quantitative analysis it is impossible to verify the validity of economic/financial theories. Thus, this course is very important because it will help students to understand how quantitative analysis works in Economics/Finance in terms of analyzing data and estimating linear relationships between several variables. The tools students will learn in this course will allow them to analyze financial data and derive policy conclusions.

The course is taught in four parts: The first part will introduce concepts and methods from probability theory and statistical inference. The second part will present correlation analysis and regression analysis using the simple two variable regression model. The third part will examine the multiple regression model along with the problems that may typically arise in regression analysis. The fourth part will discuss some of the issues that appear in regression analysis. The emphasis of the course will be given in presenting and understanding the techniques and discussing the outcomes using real data. The course will not focus on memorizing mathematical derivations and the proofs of several theorems.

**Course Prerequisites**

The course will be taught in a self-contained way and therefore all materials needed for a good understanding of the concepts of this course will be presented in class. Students do not need to worry about their statistical or econometric background. The course will provide brief reviews of background concepts and small proofs when needed.

### **Textbook**

The following textbook provides a good coverage of most of the topics presented in this course.

McClave, T. J., Benson, P. G. and Sincish, T., *Statistics for Business and Economics*, 9th edition, Prentice Hall, 2005.

### **Other useful Textbooks**

- Greene, W. H., *Econometric Analysis*, Prentice Hall, 2003.
- Johnston, J. and Dinardo, J., *Econometric Methods*, McGraw Hill, 1997.
- Newbol, P., Carlson, W. L. and Thorne, B. *Statistics for Business and Economics*, 6th edition, Pearson Prentice Hall, 2006.
- Mills, T., *The Econometric Modeling of Financial Time Series*, Second Edition, Cambridge University Press, 1999.
- Pindyck, S. R. and Rubinfeld, L. D., *Econometric Models and Economic Forecasts*, McGraw Hill, 1998.
- Watsham, J. T. and Parramore, K., *Quantitative Methods in Finance*, International Thomson Business Press, 1997.

### **Tutorial Classes**

Additional tutorial classes will be offered during regular classes. Tutorials will provide a mixture of additional applications and review of material covered in the lectures.

### **Grading Procedures and Policies**

There will be 1000 total points for this course, with the following breakdown:

- 400 points for the Assignments
- 600 points for the Final exam

There will be four assignments in this course (100 points each) which are intended to give students the opportunity to analyze data sets through the use of methods presented in the lectures. Each assignment is meant to be a short application of the material covered in class. More details on how to work on each assignment will be given in class as the course progresses.

All course assignment will be at the team level. You will be assigned to teams of 5 students and each team member is responsible for his/her performance. Points at each assignment will be given equally to each team member. Assignments will be collected at the **beginning** of class on their due date.

## Course Outline

---

### I. INTRODUCTION

1. What is Econometrics?
2. Economic versus Econometric Model
3. How Econometrics Works

### II. STATISTICS

1. Random Variables (Discrete – Continues)
2. Moments – Properties
3. Distributions of Random Variables
4. Parameter vs. Estimator – Properties of Estimators
5. Sample Mean and Sample Variance
6. Statistical Inference I (Confidence Interval)
7. Statistical Inference II (Hypothesis Testing)
8. Test for Normality

### III. THE SIMPLE LINEAR REGRESSION MODEL

1. Correlation Coefficient – Properties
2. Sample Correlation Coefficient – Hypothesis Testing
3. The Simple Linear Regression Model – Presentation
4. Regression vs. Correlation
5. OLS Estimation
6. Coefficient of Determination
7. Properties of OLS Estimators
8. The unbiased estimator of  $\sigma^2$
9. Statistical Inference for the regression parameters
10. Maximum Likelihood Estimation
11. Forecast

### IV. THE MULTIPLE LINEAR REGRESSION MODEL

1. The Multiple Linear Regression Model – Presentation
2. OLS estimation
3. Matrix notation
4. Coefficient of Determination – Adjusted – Information Criteria
5. Partial Correlation Coefficient
6. Gauss-Markov Theorem
7. Statistical Inference for the regression parameters
8. Analysis of Variance
9. Joint tests for linear restrictions of the regression coefficients
10. Forecast