STATISTICS-II

National University of Sciences & Technology

Course Details

Course Title: Statistics-II

Course Code: STAT-221 Prerequisite: Statistics-I

Program: BS A&F Credit Hours: 3

Course Description

Finance makes extensive use of probability and regression models to make a precise statement about the empirical validity of the financial theories. By implying the statistical models over the financial data one can interpret the relationship between underlying variables. These relationships are estimated through some parameters relaying upon some distributional assumptions which we expect financial data to follow. Therefore in this course we will study different probability distributions and various estimation techniques to facilitate the interpretation of regression parameters. We will also discuss the limitations of addressing all real-world phenomenon, within a statistical model. The course is continuation of basic statistics course wherein students were introduced to the basic concepts used in statistics. This course is at higher level where student will be equipped with more advance techniques and tools and their applications to finance and economics. The key objective for this course is to increase the extent to which statistical thinking is embedded in financial decision making under uncertainties. This course provides sufficient background in applied statistics to prepare students for further study in Accounting & Finance curriculum.

Course Objectives

The enhanced computational skills have provided the impetus to use advance statistics to estimate the models and testify the relevance of various theories in social sciences. The main objectives of this course are,

- To give the introduction to the subject of probability and discuss it at various level of sophistication. Further to describe the discrete and continuous probability distributions.
- Elaborate the sampling techniques and discuss interval estimation and

hypothesis testing.

- To discuss in detail the linear regression, multiple regressions and interpret regression output.
- To conduct the univariate time series modeling and forecasting.
- Modeling volatility.

Learning Outcomes

Students will be able to achieve the following things:

- With the aid of SPSS, prepare a business report requiring collecting, organizing, presenting and analyzing data
- Decide when and how to use various concepts and statistical techniques such as estimation of population parameters from sample statistics; minimum sample size necessary to achieve given statistical goals
- Perform and understand the logic of hypothesis testing including ANOVA and Tukey-Kramer and other multiple tests with numerical data
- Understand and explain Type I and Type II errors
- Use simple and multiple regression to forecast
- Make recommendations for a business based on statistical analysis of data

Required Course Material

Following books will be required for this course

Business Statistics, A Two-Semester Text for Business Management, 6th Edition.
Darryl Smith and Clare Chua
Statistics for business and economics by Anderson Sweeney Williams, cengage

learning 2011. Introductory Econometric for Finance by Chris Brooks, Cambridge, 2008

A basic calculator is required, however a financial calculator is recommended.

Course Evaluation (Grade Breakup)

Grading will be done as per NBS criteria. The breakup of the grade points is as follows:

(Sample here)

Final Exam	40%
Mid Semester Exam	25%
Final Project (max 4)	15%
Presentation (group)	10%
Quizzes	10%

Course Content (Weekly)

Weekly breakdown is given below

Week	Lecture Topic
1-6	Introduction to probability Probability distributions (Probability with Equally Likely Outcomes, What Is Probability), Axioms of Probability (independence, Bayes Law), Probability Distributions (random variables independence, cumulative distribution functions, Quantiles and percentiles, expectation and variance), function of random variables, random samples) Sampling techniques Interval estimation
7-8	Sample and Sampling distributions Binomial distribution, common continuous distributions(uniform, normal and lognormal) sampling a normal distribution (Chi Square, t and f distributions) Test for Hypothesis (on a single mean, two means, variances,

	proportions, Interval Estimation of mean and variances) law of large numbers and central limit theorem Multivariate distributions (correlation and covariance, independence and covariance) Estimation (Maximum Likelihood estimation and standard errors) confidence intervals (confidence intervals for mean, variance and standard deviation, confidence intervals and standard errors) Hypothesis testing (hypothesis, types of errors and rejection regions) t and p value concept statistical verses practical significance test of normality and likelihood ratio tests Statistical inferences
9	Mid-Term Examination
10-12	Least square regression Regression and correlation Coefficient of determination Estimates for Simple Linear Regression ANOVA for Regression Standard errors Testing for significance Analysis of variance R-square and F-Test (AOV table, sum of squares, R-squares, Degree of freedom, adjusting R-square) Regression and best linear prediction Residual Analysis (validating model assumptions) Model selection Multiple regression (introduction, Inference about the regression parameters) Regression analysis

13-15	Univariate time series modeling Modeling long-run relationship in finance
16	Modeling Volatility
17	Group Presentations **Exam Review**
18	**Final Examination.**