

Academic Year: (2019 / 2020)

Review date: 30-04-2019

Department assigned to the subject: Statistics Department

Coordinating teacher: JIMENEZ RECAREDO, RAUL JOSE

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Statistics I

OBJECTIVES**SPECIFIC SKILLS:**

Students will acquire knowledge and skills necessary to:

1. Perform statistical inference in one population
2. Understand the key concepts in hypothesis testing
3. Become familiar with the issues of comparing two populations
4. Interpret and apply the concepts of the simple linear regression model
5. Carry out the abovementioned analyses in statistical software

GENERAL SKILLS

Students will be able to:

1. Develop their ability to think analytically
2. Become familiar with a statistical software
3. Establish a framework to solve problems
4. Develop their interactive skills
5. Enhance their critical thinking
6. Improve their learning skills and communication

DESCRIPTION OF CONTENTS: PROGRAMME

Chapter 1. Inference in one population

- 1.1 Introduction: parameters and statistical inference
- 1.2 Point estimators
- 1.3 The estimation of the mean and variance
- 1.4. The sampling distribution of the sample mean
- 1.5 Estimation using confidence intervals
 - 1.5.1 Confidence interval for the mean of a normal population with known variance
 - 1.5.2 Confidence interval for the mean in large samples
 - 1.5.3 Confidence interval for the mean of a normal population with unknown variance: t distribution
 - 1.5.4 Confidence interval for the variance of a normal population

Chapter 2. Basic concepts in hypothesis testing

- 2.1 Definition of a test of hypothesis
- 2.2 The null and alternative hypotheses
- 2.3 Type I and type II errors, power of the test
- 2.4 The concept of p-value and decision-making
- 2.5 Main steps needed to perform a test of hypothesis

Chapter 3. Comparing two populations

- 3.1 Independent samples from two populations
- 3.2 Inference for the population means in small samples
- 3.3 Inference for the population means in large samples
- 3.4 Comparing the variances of two normal populations: the F distribution

Chapter 4. Regression analysis: the simple linear regression model

- 4.1 The goal of regression analysis
- 4.2 The specification of a simple linear regression model
- 4.3 Least-squares estimators: construction and properties

- 4.4 Inference in the linear regression model
- 4.5 Inference for the slope
- 4.6 Inference for the variance
- 4.7 Mean response and confidence intervals
- 4.8 New response and prediction intervals

Chapter 5. Regression analysis: assumptions, model diagnostics, multiple linear regression model

- 5.1 The residual analysis
- 5.2 The ANOVA decomposition
- 5.3 Nonlinear relationships and linearizing transformations
- 5.4 The linear regression model in matrix form
- 5.5 Introduction to multiple linear regression

LEARNING ACTIVITIES AND METHODOLOGY

Theory (3 ECTS): During theoretical sessions, the contents of the course will be introduced, explained and illustrated with examples. Teaching materials will be provided on the Internet.

Practice (3 ECTS): During practical sessions, black-board exercises will be solved. Software-related activities will take place in the computer labs.

In the 15th week of the term, a group-review session for the final exam will be held.

ASSESSMENT SYSTEM

40% of the grade is obtained through a final exam.

The remaining 60% from two midterms (20% + 20%) and home works related to computational practices (20%).

Students who reach at least 5/10 in average on the midterms and whose cumulated evaluation is 6/10 or higher, are exempt from taking the final exam. In that case, the final grade would be the cumulated grade duly escalated.

% end-of-term-examination:	60
% of continuous assessment (assignments, laboratory, practicals...):	40

BASIC BIBLIOGRAPHY

- Cheng Lee Statistics for business and financial economics, World Scientific, 2000
- Paul Newbold Statistics for Business and Economics, Pearson Prentice Hall, 2010

ADDITIONAL BIBLIOGRAPHY

- Sheldon Ross Introductory Statistics, Elsevier Academic Press, 2005