Statistics

Academic Year: (2021 / 2022)   Review date: 28-06-2021

Department assigned to the subject: Statistics Department

Coordinating teacher: AUSIN OLIVERA, MARIA CONCEPCION

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

It is advisable to have successfully completed the following courses:

- Differential calculus - Course 1 - Semester 1
- Integral calculus - Course 1 - Semester 2
- Vector calculus - Course 1 - Semester 2
- Probability - Course 2 - Semester 2

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Statistical inference.
1.0. Population and sample.
1.1. Elements of descriptive statistics.
1.2. Random sampling.
1.3. Point estimation
1.4. Inference under the normal distribution
1.5. Inference for large samples
1.6. Estimation methods
1.6.1. Method of moments
1.6.2. Maximum likelihood estimation

2. Confidence intervals.
2.1. Introduction
2.1.1. Pivotal quantities
2.2. Confidence intervals under the normal distribution
2.2.1. Confidence intervals for one population
2.2.2. Confidence intervals for two populations
2.3. Asymptotic confidence intervals

3. Hypothesis testing
3.1. Introduction
3.2. Type I and type II errors.
3.3. Power of a test
3.4. Hypothesis testing under the nomal distribution
3.4.1. Tests for one populations
3.4.2. Tests for two populations
3.5. Asymptotic tests

4. Non-parametric tests
4.1. Introduction
4.2. Goodness-of-fit test
4.2.1. Chi square test
4.2.2. Kolmogorov-Smirnov test
4.2.3. Lilliefors test
4.2.4. Graphical tools
4.3. Tests based on the binomial distribution
4.4. Tests based on ranks
4.5 Tests of independence and homogeneity

5. Linear regression

5.1. Introduction
5.2. Simple linear regression
5.3. Multiple linear regression

LEARNING ACTIVITIES AND METHODOLOGY

THEORETICAL-PRACTICAL CLASSES. [44 hours with 100% classroom instruction, 1.67 ECTS]
Knowledge and concepts students must acquire. Student receive course notes and
will have basic reference texts to facilitate following the classes and carrying
out follow up work. Students partake in exercises to resolve practical problems
and participate in workshops and evaluation tests, all geared towards
acquiring the necessary capabilities.

TUTORING SESSIONS. [4 hours of tutoring with 100% on-site attendance, 0.15 ECTS]
Individualized attendance (individual tutoring) or in-group (group tutoring)
for students with a teacher.

STUDENT INDIVIDUAL WORK OR GROUP WORK [98 hours with 0 % on-site, 3.72 ECTS]

WORKSHOPS AND LABORATORY SESSIONS [8 hours with 100% on site, 0.3 ECTS]

FINAL EXAM. [4 hours with 100% on site, 0.15 ECTS]
Global assessment of knowledge, skills and capacities acquired throughout the
course.

METHODOLOGIES

THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual
support in which the subject's main concepts are developed, while providing
material and bibliography to complement student learning.

PRACTICAL CLASS. Resolution of practical cases and problem, posed by the
teacher, and carried out individually or in a group.

TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or
in-group (group tutoring sessions) for students with a teacher as tutor.

LABORATORY PRACTICAL SESSIONS. Applied/experimental learning/teaching in
workshops and laboratories under the tutor's supervision.

ASSESSMENT SYSTEM

EVALUATION SYSTEMS

SE1 - FINAL EXAM. [60 %]
Global assessment of knowledge, skills and capacities acquired throughout the
course.

SE2 - CONTINUOUS EVALUATION. [40 %]
Assesses papers, projects, class presentations, debates, exercises, internships
and workshops throughout the course.

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

BASIC BIBLIOGRAPHY

 - MONTGOMERY, D.C., RUNGER, G.C. Applied Statistics and Probability for Engineers, John Wiley & Sons, 2003

 - NAVIDI, W. Statistics for Engineers and Scientists., McGraw-Hill, 2006

 - NEWBOLD, P., CARLSON, W.L., THORNE, B. Statistics for Business and Economics., Prentice-Hall, 2013

 - WACKERLY, D.D., MENDENHALL, W., SCHEAFFER, R.L. Mathematical statistics with applications, Thomson, 2008

ADDITIONAL BIBLIOGRAPHY

- ARNOLD, S.F. Mathematical Statistics, Prentice Hall, 1990

- CASELLA, G., BERGER, R.L. Statistical Inference, Duxbury, 2002

- CONOVER, W.J. Practical nonparametric statistics, John Wiley & Sons, 1999

- PEÑA, D. Fundamentos de Estadística, Alianza Editorial, 2001

- PEÑA, D. Regresión y Diseño de Experimentos, Alianza Editorial, 2002