29005 - Applied statistics

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. In the learning process, different teaching methodologies will be used depending on whether the modality of face-to-face or distance learning is used. The indicated teaching methodologies allow the involvement of the student in their learning process and allow the teachers to solve the problems and doubts that may arise.

The teaching methodologies for the face-to-face students are the following:

1. **Theory and practice sessions**. The presentation of contents by the teacher, including practical exercises on the blackboard.
2. **Workshop**. Supervised session where students work individually or in groups and receive assistance and guidance when necessary.

3. **Problem-based learning**. Educational approach oriented to learning and teaching in which the students solve real problems in small groups and under the supervision of a tutor.

The teaching methodologies for distance students are the following:

1. **The study materials prepared by the faculty**, which will consist, for each of topic that make up the course, of at least one didactic guide for the preparation of the theoretical contents, the elaboration of the continuous assessment tests, the offer of training activities on the Moodle platform (discussion forums, tasks, wikis...) and evaluation systems.
2. **Workshop**. Supervised session where students work individually or in groups and receive assistance and guidance when necessary.
3. **Problem-based learning**. Educational approach oriented to learning and teaching in which the students solve real problems in small groups and under the supervision of a tutor.

4.2.Learning tasks

This course is organized as follows:

A. Training activities for the face-to-face students:

1. Teaching sessions. This part consists on the 40% of the workload of this course. It includes the interaction of students with teaching teams through:

- Lectures. The teacher or external experts explain the contents to the students.
- Practice sessions. Practical exercises, problems and cases solved by the students.
- Assignments.
- Face-to-face tutorials, in which specific orientations will be offered on the different topics, additional contents for a deeper study of the course, tips for a better approach to the course and assessment tasks.

2. Autonomous work. This part consists on the 60% of the workload of this course. It includes:

- The individual study of the topics proposed by the teaching staff.
- The preparation of team and individual assignments. Preparation of activities to present or hand in in the practice sessions or assessment sessions.
- Autonomous work on the practical activities proposed by the teacher in the continuous assessment.
- Assessment tasks and exams.

B. Training activities for distance students:

1. Distance learning activities. This part consists on the 20% of the workload of this course. It includes the interaction of students with teaching teams through:

- Working sessions with OpenMeetings: OpenMeetings is a free software that allows classes, lectures and expository techniques to be carried out through the internet. In addition, it allows all the participants to share the desktop, so they can see the screen e.g. presentations, software, etc.
- Face-to-face/online tutorials, in which specific orientations will be offered on the different topics, additional contents for a deeper study of the course, tips for a better approach to the course and assessment tasks.
- Virtual work in networks or activities on the Moodle platform. Collaborative work that starts from a virtual space (Teaching Digital Ring, specifically Moodle platform), designed by the teacher and of restricted access, in which documents can be shared to work on them simultaneously and new ones can be added. It also contains the classes and lectures, both theoretical and virtual practical activities. It also allows the student to communicate in a synchronous and asynchronous manner, and participate in all the discussions.

2. Autonomous work training activities. This part consists on the 80% of the workload of this course. It includes:

- The individual study of the topics proposed by the teaching staff.
- The preparation of team and individual assignments. Preparation of activities to present or hand in in the practice sessions or assessment sessions.
- Autonomous work on the practical activities proposed by the teacher in the continuous assessment.
- Assessment tasks and exams.

4.3.Syllabus

The course will address the following topics:

SECTION I: DESCRIPTIVE STATISTICS

- **Topic 1**. Introduction. General concepts. Meanings of the term Statistic. A brief historical approach. Applications of statistics in different fields of knowledge, paying particular attention to its presence in the field of Public Administrations.
- **Topic 2**. Frequency distribution. Graphic representations. Statistical variable. Attribute. Frequency distributions.
- **Topic 3**. Measures of location. Arithmetic mean and properties. Geometric mean. Harmonic mean. Median. Mode. Quartiles.
- **Topic 4**. Measures of variability. Range, semi-interquartile range, mean deviation, variance, standard deviation. Coefficient of variation.
- **Topic 5**. Shape and concentrations parameters. Pearson's coefficient of skewness. Fisher's coefficient of skewness. Bowley's coefficient of skewness. Kurtosis coefficient g2. The GIM Index. The Lorenz curve.
- **Topic 6**. Bivariate distributions. Bivariate frequency distribution. Graphic representation. Marginal distributions. Conditional distributions. Independent Statistics. Covariance.
- **Topic 7**. Adjustment methods. The Method of Least Squares. The Linear adjustment.
- **Topic 8**. Regression and correlation. Regression lines. Regression coefficient. Linear correlation coefficient.

SECTION II: SPECIAL TECHNIQUES

- **Topic 9**. Index numbers. Simple and composite index numbers. Price index numbers. Quantity index numbers. Deflation (inflation adjustment). Consumer price index (CPI)
- **Topic 10**. Time series. Numerical and graphical representations. Time series components: trend, cyclical, seasonal and irregular. Additive and multiplicative models.

SECTION III: PROBABILITY AND RANDOM VARIABLES

- **Topic 11**. Introduction to Probability. Sample space. Events. Formal definition of probability. Counting techniques.
- **Topic 12**. Conditional probability and independence. Total probability theorem. Bayes theorem.
- **Topic 13**. Random variables and probability distributions. Discrete probability distributions: binomial and Poisson. Mean and standard deviation of a discrete probability distribution.
- **Topic 14**. Continuous probability distributions: Normal distribution. The probability density function of the normal distribution. Applications.

4.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Business and Public Management website and Moodle.

Training activities for the face-to-face students:	Hours
1.a. Face-to-face training activities: Lectures	30

1.b. Face-to-face training activities: Practice sessions	15
1.c. Face-to-face training activities : Assignments	10
1.e. Face-to-face training activities: Face-to-face tutorials	5
2.a. Autonomous work training activities: Individual study	35
2.b. Autonomous work training activities: The preparation of team and individual works	10
2.d. Autonomous work training activities: Autonomous work on the practical activities proposed by the teacher in the continuous assessment	40
2.e. Autonomous work training activities: Assessment tasks and exams	5
Training activities for distance students	**Hours**
1.a. Distance learning activities : Working sessions with OpenMeetings	15
1.b. Distance learning activities : Face-to-face tutorials and / or online tutorials	5
1.c. Distance learning activities : Virtual work in network**s** or activities in the Moodle platform	10
2.a. Autonomous work training activities : The individual study	50
2.b. Autonomous work training activities: The preparation of team and individual works	15
2.d. Autonomous work training activities : Autonomous work on the practical activities proposed by the teacher	50

in the continuous assessment	
2.e. Autonomous work training activities: Assessment tasks and exams	5

4.5.Bibliography and recommended resources

[BB: Basic bibliography / CB: Complementary bibliography]

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- [CB] Casas Sánchez, José Miguel. Introducción a la estadística para economía y administración de empresas / José M. Casas Sánchez, Julián Santos Peñas . Madrid : Editorial Centro de Estudios Ramón Areces 1995
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- [CB] Peña Sánchez de Rivera, Daniel. Estadística : modelos y métodos. Vol. 1, Fundamentos / Daniel Peña Sánchez de Rivera . [2ª ed. rev., 12ª reimp.] Madrid : Alianza, 2000