Information about the subject

Degree: Bachelor of Science Degree in Business Administration and Management

Faculty: Faculty of Legal, Economic and Social Sciences

Code: 300308 **Name:** Statistical Inference

Credits: 6,00 **ECTS Year:** 3 **Semester:** 2

Module: Quantitative Methods

Subject Matter: Statistical and Econometric Methods **Type:** Compulsory

Field of knowledge: Ingeniería y Arquitectura

Department: -

Type of learning: Classroom-based learning / Online

Languages in which it is taught: English, Spanish

Lecturer/-s:

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30GI3	Alberto Sanz Cazorla **(Profesor responsable)**	alberto.sanz@ucv.es
31GI4	Alberto Sanz Cazorla **(Profesor responsable)**	alberto.sanz@ucv.es

Module organization

Quantitative Methods

Subject Matter	ECTS	Subject	ECTS	Year/semester
Information Systems	12,00	Information Systems for Management I	6,00	1/2
		Information Systems for Management II	6,00	2/1
Mathematics	6,00	Mathematics for Economics and the Business	6,00	1/1
Statistical and Econometric Methods	12,00	Econometrics	6,00	4/1
		Statistical Inference	6,00	3/2
Statistics	6,00	Descriptive Statistics	6,00	2/1

Recommended knowledge

Basic knowledge of descriptive statistics

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

R1 To consult, based on the problem proposed, the most important information sources and make an adequate analysis form the data obtained.

R2 To break down a complex problem into several parts and establish complex causal links. To recognize several possible causes of an event or several consequences of an action or a chain of events.

R3 Given an already formalized problem, be able to apply the techniques learned to solve it and be able to decide whether or not you can get a solution or not, so that, in the second case, you can approximate the solutions. To be able to decide if the solution obtained is reasonable, according to the context in which the problem is formulated.

R4 To recognize accurately the populations and random variables underlying the problems they face and to be able to define the concept of a representative sample. Expose the basic idea of the Central Limit Theorem and its practical implications.

R5 To express opinions clearly and precisely and to be able to ask control and follow-up questions. Given a "verbalized" problem, be able to translate it into formal language and identify economic facts based on their numerical substrate and be able to establish basic relationships.

R6 To calculate the probability of complex economic events, obtained by means of econometric operations, and to recognize these operations in statements of real problems.

R7 To differentiate discrete random variables from continuous variables and to calculate mathematical expectations and variances of both types of variables, as well as to apply appropriate mathematical theorems.

R8 To solve simple problems involving the distribution of continuous variables. To identify in real problems random variables that can be modeled using different distributions and easily handle distribution tables to solve problems where variables can be modeled using this distribution.

R9 To express the conclusions of an econometric study in economic terms and to convey those conclusions to people unfamiliar with statistical terminology.

R10 To consult, based on the problem posed, the most appropriate sources of information and to make appropriate use of the data collected. To carry out systematic work to obtain the maximum and most appropriate information from all the available secondary sources (newspapers, magazines, databases, etc.)

R11 To handle office packages and especially be able to use the Excel formulation fluently. To be able to handle some of the usual computer tools, so that he/she can provide numerical approximations to the problems posed. To use and interpret the results of a computer program to handle the various econometric techniques, in order to overcome the obstacle of complex calculations associated with them.

Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB1	That students have demonstrated knowledge and understanding in an area of study that is at the core of general secondary education, and is often at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.	x			
CB2	That students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.	x			
CB3	That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific or ethical issues.			x	
CB4	That students can convey information, ideas, problems and solutions to both specialized and non-specialized audiences.			x	
CB5	That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.				x

GENERAL		Weighting			
		1	2	3	4
CG0	Speaking well in public.		x		
CG1	Capacity of analysis and synthesis.				x
CG3	Capacity to apply knowledge into practice.				x
CG5	Oral and written communication.			x	
CG6	Use of ICTs			x	

CG7	Information management.				x
CG8	Orientation to problem-solving.				x
CG9	Decision-making orientation.			x	
CG11	Creativity and ability to generate new ideas.			x	
CG13	Ability to learn and research skills.				x
CG18	Ability to obtain, from the data, valuable information for decision making.				x

SPECIFIC		Weighting			
		1	2	3	4
CE14	To understand the potential impact of aspects related to the macro- and microeconomic environment and its institutions on business organizations (e.g. the monetary and financial system, domestic markets)			x	
CE15	Ability to obtain, from the data, valuable information for decision making.				x
CE17	Application of professional criteria to the analysis of business problems.			x	
CE18	Ability to integrate in any functional area of a company and develop different tasks related to its management.		x		

Assessment system for the acquisition of competencies and grading system

In-class teaching

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	15,00%	Objective Tests
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	25,00%	Conduct of Theory-Practice
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	10,00%	Class attendance and participation
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	50,00%	Final Exam

Observations

1) In order to pass the subject, it will be an essential **requirement** obtaining **at least 5 points out of 10 in the final exam** of the subject in any of its two calls. In case of failing the final exam, the weighted final grade of the course may not exceed 4.9 points.
2) Because of its very nature, **continuous evaluation** (attendance and participation in class, theoretical-practical activities and objective tests) **is not recoverable. The score obtained in this section will therefore be maintained in both first and second calls.**

Online teaching

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	5,00%	Attendance and participation in the activities of synchronous communication
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	25,00%	Conduct of deliverables
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	15,00%	Regular evaluations through online questionnaires.
R1, R2, R3, R4, R5, R6, R7, R8, R9, R11	5,00%	Participation in discussion forums
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	50,00%	Final on-site assessment.

Observations

In order to pass the course, it is necessary to have submitted and passed all the activities proposed throughout the course. In any case, it will be necessary to pass the final exam of the course.

MENTION OF DISTINCTION:
According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 (“Sobresaliente”). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1	Problem solving, commentaries, summaries to hand in periodically.
M3	Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.
M5	Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity.
M7	Supervised monographic sessions with shared participation.
M9	Application of multidisciplinary knowledge.
M11	Personalized and small group attention. Period of instruction and / or orientation conducted by a tutor with the objective of reviewing and discussing the materials and topics presented in classes, seminars, readings, conducting work, etc.
M13	Set of oral and/or written tests used in initial, formative or additive assessment of the student.
M14	Student study: Group Individual preparation of readings, essays, problem solving, seminars, papers, reports, etc. to be presented or submitted in theoretical lectures, practical and/or small-group tutoring sessions.

M16 Group preparation of readings, essays, problem solving, seminars, papers, reports, etc. to be presented or submitted in theoretical lectures, practical and/or small-group tutoring sessions.

M17 Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.

M19 Groupwork sessions in the chat under supervision of the lecturer. Analysis of economic and business case studies, both real and fictitious, in order to build knowledge through the student's interaction and activity. Critical analysis of values and social commitment.

M21 Monographic sessions though the semester, which will be aimed at current aspects and applications of the subject.

M23 Set of written or oral tests used for the initial, formative or cumulative assessment of the student.

M25 Student study: Individual preparation of readings, essays, problem solving, seminars, papers, reports, etc., for their discussion or submission in electronic format.

M27 Individual support for the monitoring and orientation of the learning process. It will be carried out by a lecturer and will pursue the revision and discussion of the materials, topics, readings, tasks, etc.

M29 Group preparation of readings, essays, problem solving, seminars, papers, reports, etc., for their discussion or submission.

M31 Participation in discussion forums related to the subject under the supervision of the lecturer.

IN-CLASS LEARNING

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
On-campus Class M3	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	22,50	0,90
Practical Class M5	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	15,00	0,60
Seminar M7	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	4,50	0,18
Group Presentation of Papers M5	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	6,00	0,24
Office Assistance M11	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	6,00	0,24
Assessment M13	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	6,00	0,24
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Group Work M16	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	30,00	1,20
Independent Work M14	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	60,00	2,40
TOTAL		**90,00**	**3,60**

ON-LINE LEARNING

SYNCHRONOUS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Synchronous Virtual Session M17	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	4,00	0,16
Synchronous Vitual Practical Session M19	R1, R2, R3, R4, R5, R6, R7, R8, R9, R11	4,00	0,16
Seminar and Synchronous Virtual Videoconference M21	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	4,00	0,16
On-site or Synchronous Virtual Assesment M23	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	3,00	0,12
TOTAL		**15,00**	**0,60**

ASYNCHRONOUS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Individual Work M25	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	60,00	2,40
Tutorial Support Sessions M27	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	5,00	0,20
Group Work M29	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	10,00	0,40
Discussion Forum M31	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	10,00	0,40
Continuous Assessment Tasks M1	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11	50,00	2,00
TOTAL		**135,00**	**5,40**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
Introduction to Statistical Inference	1.Introduction to statistical Language 2.Sampling Methods 3.The Central Limit Theorem
Estimation and Confidence Intervals	1.Compute and interpret a point estimate of a population mean. 2.Compute and interpret a confidence interval for a population mean. 3.Compute and interpret a confidence interval for a population proportion. 4.Calculate the required sample size to estimate a population proportion or population mean. 5.Adjust a confidence interval for finite populations.
One Sample-Test of hypothesis	1.Define a hypothesis. 2.Explain the process of testing a hypothesis. 3.Apply the six-step procedure for testing a hypothesis. 4.Distinguish between a one-tailed and a two-tailed test of hypothesis. O10-5 Conduct a test of a hypothesis about a population mean. 5.Compute and interpret a p-value. 6.Use a t statistic to test a hypothesis 7.Compute the probability of a Type II error.

Two-Sample Test of Hypothesis	1.Test a hypothesis that two independent population means are equal, assuming that the population standard deviations are known and equal. 2.Test a hypothesis that two independent population means are equal, with unknown population standard deviations. 3.Test a hypothesis about the mean population difference between paired or dependent observations. 4.Explain the difference between dependent and independent
Analysis of Variance	1.Use ANOVA to test a hypothesis that three or more population means are equal.
Non- Parametric Methods	1.Perform a hypothesis test to determine if there is any relationship between two classification criteria.

Temporary organization of learning:

Block of content	Number of sessions	Hours
Introduction to Statistical Inference	3,00	6,00
Estimation and Confidence Intervals	4,00	8,00
One Sample-Test of hypothesis	5,00	10,00
Two-Sample Test of Hypothesis	10,00	20,00
Analysis of Variance	5,00	10,00
Non- Parametric Methods	3,00	6,00

References

·Professor notes

·Basic:

·Newbold, Paul, Carlson, William L. & Thorne, Betty (2013) Statistics for Business and Economics. Pearson Prentice Hall / 8th global edition/

·Lind, D. A., Marchal, W. G., & Wathen, S. A. (2019). *Statistical techniques in business & economics* (Vol. 17). New York, NY: McGraw-Hil

·Lind, D. A., Marchal, W. G., & Wathen, S. A. (2020). *Basic statistics for business & economics*.(Vol. 9). Boston: McGraw-Hill/Irwin,.

·Bowerman, B. (2019). *Business Statistics in Practice: Using Data, Modeling, and Analytics*. McGraw-Hill Higher Education.

·Complementary

·Gujarati, D. N., & Porter, D. (2009). Basic Econometrics Mc Graw-Hill International Edition.

·González, G. M. (2007). *Introducción a la estadística*. Universidad Católica de Valencia.

·Berenson, M. L., Levine, D. M., & Krehbiel, T. C. (2014). *Estadística para administración*. Pearson Education

·Parra Frutos, I. (2003). Estadística empresarial con Microsoft® Excel: Problemas de inferencia. AC Libros científicos y técnicos

·Montiel Torres, A. M., Barón López, F. J., & Rius Díaz, F. (1997). *Elementos básicos de estadística económica y empresarial*

Addendum to the Course Guide of the Subject

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject.

Situation 1: Teaching without limited capacity (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

Situation 2: Teaching with limited capacity (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching. Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:

[X] Microsoft Teams

[ ] Kaltura

Situation 3: Confinement due to a new State of Alarm.

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

X	Microsoft Teams
	Kaltura

Explanation about the practical sessions:

2. System for Assessing the Acquisition of the competences and Assessment System

ONSITE WORK

Regarding the Assessment Tools:

[X] The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.

[ ] The following changes will be made to adapt the subject's assessment to the online teaching.

Course guide		Adaptation	
Assessment tool	Allocated percentage	Description of the suggested changes	Platform to be used

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

Comments to the Assessment System:

ONLINE WORK

Regarding the Assessment Tools:

[X] The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.

[ ] The following changes will be made to adapt the subject's assessment to the online teaching.

Course guide		Adaptation	
Assessment tool	Allocated percentage	Description of the suggested changes	Platform to be used

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

Comments to the Assessment System: