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 Econometrics Methods **Type:** Compulsory

Department: Economics, Business Management, and Marketing

Type of learning: Classroom-based learning / Online

Languages in which it is taught: English, Spanish

Lecturer/-s:

303A	Alberto Sanz Cazorla **(Responsible Lecturer)**	alberto.sanz@ucv.es
303B	María Aranzazu Juan Blanco **(Responsible Lecturer)**	ma.juan@ucv.es
314D	Alberto Sanz Cazorla **(Responsible Lecturer)**	alberto.sanz@ucv.es
CATT	Alberto Sanz Cazorla **(Responsible Lecturer)**	alberto.sanz@ucv.es
30GI3	Alberto Sanz Cazorla **(English Responsible Lecturer)**	alberto.sanz@ucv.es
31GI4	Alberto Sanz Cazorla **(English Responsible Lecturer)**	alberto.sanz@ucv.es

Module organization

Quantitative Methods

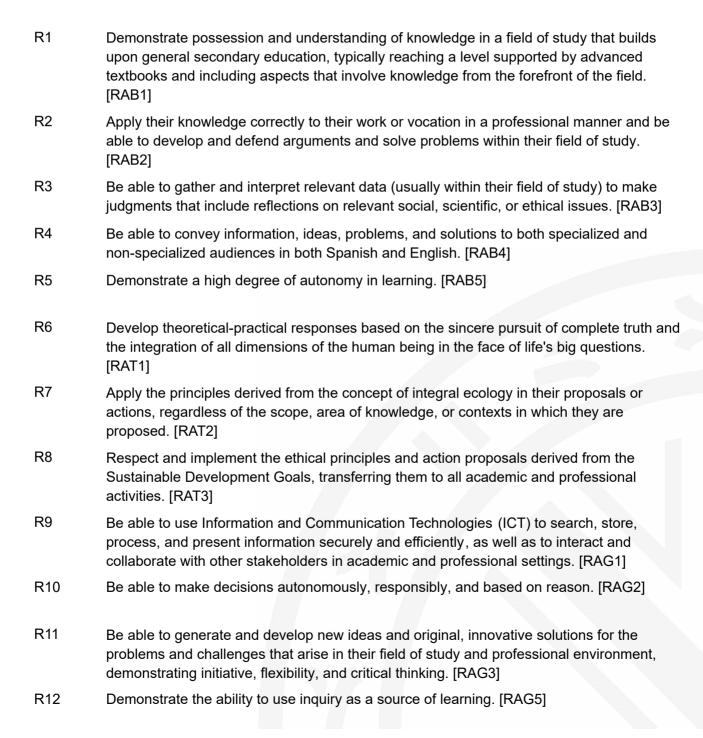| Subject Matter	ECTS	Subject	ECTS	Year/semester
Information Technology	12,00	Information Systems for Management I	6,00	1/2
		Information Systems for Management II	6,00	2/1
Mathematics	6,00	Mathematics for Economics and the Business	6,00	1/1
Statistical and Econometrics Methods	12,00	Econometrics	6,00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

Recommended knowledge

Although it is not a formal prerequisite, the course is taught assuming that students have passed *Descriptive Statistics* and possess the fundamental knowledge of basic descriptive statistics—measures of location, dispersion, and association—as well as the elementary notions of probability and probability distributions covered in that course. Students are also expected to be familiar with the use of spreadsheet software and the basic management of computer files for performing univariate and bivariate descriptive data analyses.

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   Demonstrate possession and understanding of knowledge in a field of study that builds upon general secondary education, typically reaching a level supported by advanced textbooks and including aspects that involve knowledge from the forefront of the field. [RAB1]

R2   Apply their knowledge correctly to their work or vocation in a professional manner and be able to develop and defend arguments and solve problems within their field of study. [RAB2]

R3   Be able to gather and interpret relevant data (usually within their field of study) to make judgments that include reflections on relevant social, scientific, or ethical issues. [RAB3]

R4   Be able to convey information, ideas, problems, and solutions to both specialized and non-specialized audiences in both Spanish and English. [RAB4]

R5   Demonstrate a high degree of autonomy in learning. [RAB5]

R6   Develop theoretical-practical responses based on the sincere pursuit of complete truth and the integration of all dimensions of the human being in the face of life's big questions. [RAT1]

R7   Apply the principles derived from the concept of integral ecology in their proposals or actions, regardless of the scope, area of knowledge, or contexts in which they are proposed. [RAT2]

R8   Respect and implement the ethical principles and action proposals derived from the Sustainable Development Goals, transferring them to all academic and professional activities. [RAT3]

R9   Be able to use Information and Communication Technologies (ICT) to search, store, process, and present information securely and efficiently, as well as to interact and collaborate with other stakeholders in academic and professional settings. [RAG1]

R10   Be able to make decisions autonomously, responsibly, and based on reason. [RAG2]

R11   Be able to generate and develop new ideas and original, innovative solutions for the problems and challenges that arise in their field of study and professional environment, demonstrating initiative, flexibility, and critical thinking. [RAG3]

R12   Demonstrate the ability to use inquiry as a source of learning. [RAG5]

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	15,00%	Objective Tests
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	25,00%	Completion of Theoretical-Practical Activities
R5, R7, R8, R10	10,00%	Class Attendance and Participation
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	50,00%	Final Exam
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	5,00%	Participation in Synchronous Communication Activities
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	30,00%	Deliverable Activities
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	10,00%	Periodic Evaluations Through Online Questionnaires
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	5,00%	Participation in Discussion Forums
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	50,00%	Final evaluation with essay questions and practical scenarios (In-person activity)

Observations

To pass the course, students must obtain **at least 5 out of 10 points** in the final in-person examination in any of the available calls: first call, second call, early call, or single comprehensive assessment. If the final exam is failed, the final weighted grade for the course **may not exceed 4.9**

out of 10.

In the second call and in the Single Comprehensive Assessment, the objective tests, theoretical-practical activities, and class participation will be assessed through an **additional in-person practical examination** consisting of computer-based data analysis, in addition to the final in-person exam.

Single Comprehensive Assessment: According to Article 9 of the General Regulations for the Assessment and Grading of Official Degrees and Internal Degrees of the UCV, the Single Comprehensive Assessment is linked to the justified impossibility of attending classes for students enrolled in a programme delivered in on-campus modality. It is therefore an **extraordinary and exceptional assessment system**, available to those students who, on duly justified and accredited grounds, cannot follow the continuous assessment system and formally request it from the course instructor, who will expressly decide on the admission of the request and communicate acceptance or rejection.

The evidence and/or assessment tasks required in the Single Comprehensive Assessment will consist of the **same theoretical exam as the rest of the students**, together with an **in-person practical examination** consisting of computer-based data analysis. The final grade will be obtained by applying the following weights: **50% theoretical exam and 50% practical exam**. This criterion applies to both the first and the second call. As in all cases, **passing the course requires—but is not limited to—obtaining at least 5 out of 10 points in the theoretical exam**. If the theoretical exam is failed, the final weighted grade for the course **may not exceed 4.9 out of 10**.

Students who do not reach **at least 80% attendance** in the in-person sessions may not be assessed through continuous assessment activities. In such cases, in addition to the final in-person exam, they must complete an **in-person practical examination** consisting of computer-based data analysis. The final grade in this scenario will be obtained by applying the following weights: **50% practical exam and 50% theoretical exam (final in-person exam)**.

During the course, the instructor will dedicate one specific session to defining and discussing **good practices in the use of artificial intelligence (AI) tools** applied to data analysis. Students who violate these good practices—either in continuous assessment activities or in the final practical examination—will receive a grade of **0 (zero points)** in the corresponding test or project.

MENTION OF DISTINCTION:

The mention of "Honors" may be awarded to students who have obtained a grade equal to or greater than 9.0. Their number may not exceed five percent of the students enrolled in a group in the corresponding academic year, unless the number of students enrolled is lower.

Learning activities

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

M1 Lecture of contents by the teacher, analysis of competencies, explanation, and demonstration of abilities, skills, and knowledge in the classroom.

M3 Supervised group work sessions led by the teacher. Study of economic-business cases, both real and fictitious. Meaningful construction of knowledge through student interaction and activity. Critical analysis of values and social commitment.

M4 Supervised monographic sessions with shared participation.

M5 Application of interdisciplinary knowledge.

M6 Personalized and small-group attention. Instruction and/or guidance period conducted by a tutor with the aim of reviewing and discussing materials and topics presented in classes, seminars, readings, completion of assignments, etc.

M7 Set of oral and/or written tests used in the initial, formative, or summative assessment of the student.

M9 Group preparation of readings, essays, problem-solving, seminars, assignments, reports, etc., to present or submit in theoretical classes, practical classes, and/or small-group tutorials.

M10 Student study: individual preparation of readings, essays, problem-solving, seminars, assignments, reports, etc., to present or submit in theoretical classes, practical classes, and/or small-group tutorials.

M11 Presentation of content by the teacher, analysis of competencies, explanation, and demonstration of skills, abilities, and knowledge in the virtual classroom.

M12 Group work sessions via moderated chat led by the teacher. Study of economic-business cases, both real and fictitious, to construct knowledge through student interaction and activity. Critical analysis of values and social commitment.

M13 Monographic sessions throughout the course, focused on current aspects and applications of the subject.

M14 Problem-solving, comments, reports, to be submitted at deadlines throughout the course.

M15 Individual attention for monitoring and guidance of the learning process, conducted by a tutor with the objective of reviewing and discussing materials, topics, seminars, readings, completion of assignments, etc.

M16 Participation and contributions to discussion forums related to the subject, moderated by the course instructor.

M17 Set of tests, written or oral, used in the initial, formative, or summative assessment of the student.

M19 Group preparation of readings, essays, problem-solving, seminars, assignments, reports, etc., for dissemination or submission.

M20 Student study: individual preparation of readings, essays, problem-solving, seminars, assignments, reports, etc., for discussion or submission in electronic format.

IN-CLASS LEARNING

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
On-campus Class M1, M4	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	22,50	0,90
Practical Class M1, M3, M5, M9	R1, R2, R3, R4, R6, R7, R8, R9, R10, R11, R12	15,00	0,60
Seminar M3, M4	R1, R2, R3, R4, R6, R8, R10, R11, R12	4,50	0,18
Group Project Presentation M3, M7, M9	R1, R2, R3, R4, R5, R6, R8, R9, R10, R11, R12	6,00	0,24
Tutoring M6	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	6,00	0,24
Evaluation M7	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	6,00	0,24
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Group Work M3	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	30,00	1,20
Individual Work M10	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	60,00	2,40
TOTAL		**90,00**	**3,60**

ON-LINE LEARNING

SYNCHRONOUS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Synchronous Virtual Session M11, M12	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	4,00	0,16
Synchronous Virtual Practical Session M12, M14, M19	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	4,00	0,16
Synchronous Virtual Seminar and Videoconference M11, M13	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	4,00	0,16
In-person Assessment M17	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	3,00	0,12
Group Work M12, M19	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	10,00	0,40
Individual Work M14, M20	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	60,00	2,40
TOTAL		**85,00**	**3,40**

ASYNCHRONOUS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Individual Tutoring M14, M19, M20	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	45,00	1,80
Discussion Forums M15	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	10,00	0,40
Continuous Assessment Activities M12, M16	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	10,00	0,40
TOTAL		**65,00**	**2,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
Introduction, Sampling, and Sampling Distributions	This section introduces the foundations of statistical inference, the concept of random sampling, and sampling variability, presenting the main sampling distributions as the basis for inferential reasoning.
Confidence Intervals for the Mean and the Proportion	This section covers the construction and interpretation of confidence intervals for population means and proportions, addressing standard error, confidence level, and sample size considerations.
Hypothesis Testing for the Mean and the Proportion	This section introduces hypothesis testing for a mean and a proportion, including formulation of hypotheses, computation of the test statistic, and interpretation of the p-value.
Hypothesis Testing for Two Means and Two Proportions	This section addresses hypothesis tests comparing two populations using means or proportions, considering independent or paired samples and evaluating the statistical significance of observed differences.
Hypothesis Testing for More Than Two Means: Analysis of Variance (ANOVA)	This section explains one-way ANOVA as a method to compare several population means simultaneously, examining its assumptions, the F statistic, and the interpretation of the test results.
Hypothesis Testing for the Relationship Between Two Quantitative Variables: Correlation and Linear Regression	This section examines the relationship between two quantitative variables through correlation and linear regression, including inference on model parameters and assessment of the significance of the relationship.
Hypothesis Testing for Two or More Proportions: Contingency Tables (Chi-square Test of Independence)	This section analyses the association between qualitative variables using contingency tables and the chi-square test, assessing whether differences in proportions can be attributed to chance.

Temporary organization of learning:

Block of content	Number of sessions	Hours
Introduction, Sampling, and Sampling Distributions	2,00	4,00
Confidence Intervals for the Mean and the Proportion	3,00	6,00
Hypothesis Testing for the Mean and the Proportion	5,00	10,00
Hypothesis Testing for Two Means and Two Proportions	7,00	14,00
Hypothesis Testing for More Than Two Means: Analysis of Variance (ANOVA)	4,00	8,00
Hypothesis Testing for the Relationship Between Two Quantitative Variables: Correlation and Linear Regression	6,00	12,00
Hypothesis Testing for Two or More Proportions: Contingency Tables (Chi-square Test of Independence)	3,00	6,00

References

·**Basic:**·Newbold, Paul, Carlson, William L. & Thorne, Betty (2013) Statistics for Business and Economics. Pearson Prentice Hall / 8th global edition/·Haslwanter, Thomas (2016) An Introduction to Statistics with Python. Springer.·Thomas , Dariin (2022). Introductory Statistics Using Python. Sujisola.·**Supplementary:**·Salsburg, David. (2002) The Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century ISBN-13 978-0805071344·Wooldridge, Jeffrey. (2012) Introductory Econometrics A Modern Approach. ISBN-13 : 978-1111531041·Heiss, Florian & Brunner, Daniel. (2020) Using Python for Introductory Econometrics. ISBN-13 : 979-8648436763