GuÍa Docente

Information about the course

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:** Obligatoria

Branch of knowledge:

Department: Economics, Business Management, and Marketing

Type of learning: Classroom-based learning / Online

Language/-s in which it is given: English, Spanish

Teachers:

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Module organization

Quantitative Methods

Subject Matter	ECTS	Subject	ECTS	Year/semester
Information Technology	12	IT Management I	6	1/2
		IT Management II	6	2/1
Mathematics	6	Mathematics for Economics and the Business	6	1/1
Statistical and Econometrics Methods	12	Econometrics	6	4/1
		Statistical Inference	6	3/2
Statistics	6	Descriptive Statistics	6	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 demonstrate having 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]

Learning outcomes of the specified title

Type of AR: Conocimientos o contenidos

- 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.

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

Learning outcomes of the specified title

Type of AR: Competencias

- Be able to make decisions autonomously, responsibly, and based on reason.

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]

Learning outcomes of the specified title

Type of AR: Competencias

- 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.

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

Learning outcomes of the specified title

Type of AR: Habilidades o Destrezas

- Demonstrate the ability to use inquiry as a source of learning.

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]

Learning outcomes of the specified title

Type of AR: Competencias

- 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.

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]

Learning outcomes of the specified title

Type of AR: Competencias

- 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.

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

Learning outcomes of the specified title

Type of AR: Competencias

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

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

Learning outcomes of the specified title

Type of AR: Habilidades o Destrezas

- Demonstrate a high degree of autonomy in learning.

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]

Learning outcomes of the specified title

Type of AR: Habilidades o Destrezas

- Demonstrate a high degree of autonomy in learning.

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]

Learning outcomes of the specified title

Type of AR: Competencias

- 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.

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]

Learning outcomes of the specified title

Type of AR: Competencias

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

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]

Learning outcomes of the specified title

Type of AR: Competencias

- 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.

Assessment system

In-person modality

Assessed learning outcomes	Granted percentage	Assessment tool
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	10,00%	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	5,00%	Class Attendance and Participation
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	60,00%	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	20,00%	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	60,00%	Final evaluation with essay questions and practical scenarios (In-person activity)

Observations

Observations

In order to pass the course, it is an essential requirement to have obtained at least 5 out of 10 in the final in-person exam of the course in any of the assessment periods: first, second, early call, or single-assessment exam. If the final exam is failed, the final weighted grade of the course will be the lower of the exam grade and the grade obtained from the continuous assessment components.

In the second call and single assessment, objective tests, theoretical-practical activities, and class attendance and participation will be assessed through an additional in-person practical exam involving computer-based data analysis, alongside the final in-person exam.

Single assessment: In accordance with Article 9 of the General Regulations on Assessment and Grading of Official Programs and UCV's own degrees, single assessment is linked to the impossibility of attendance for students enrolled in a face-to-face program. It is therefore an extraordinary and exceptional assessment system available to students who, with proper justification and supporting documentation, cannot follow the continuous assessment system and formally request it from the course instructor. The instructor will expressly decide on the acceptance or rejection of the request, and this will be communicated to the student.

The evidence to be submitted and/or the test(s) to be completed in the single assessment will consist of the same theoretical exam as the rest of the students, as well as an in-person practical exam involving computer-based data analysis. The final grade will be calculated using the following weights: 60% theoretical exam and 40% practical exam. This criterion applies to both the first and second calls. As in all cases, obtaining at least 5 out of 10 in the theoretical exam is a necessary but not sufficient condition to pass the course. If the theoretical exam is failed, the final weighted grade will be the lower of the two.

During the course, the instructor will dedicate a 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, whether in continuous assessment tasks or in the final practical exam, will receive a grade of 0 (zero) in the corresponding test or project.

CRITERIA FOR THE AWARD OF HONORS ("MATRÍCULA DE HONOR"):

According to Article 14.4 of the General Regulations on Assessment and Grading of Official Programs and UCV's own degrees, the distinction of "Matrícula de Honor" may be awarded to students who have obtained a grade equal to or higher than 9.0. The number of such distinctions may not exceed 5% of the students enrolled in a group in the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" may be awarded.

MENTION OF DISTINCTION:

According to Article 14.4 of the General Regulations for the Assessment and Grading of Official Courses and UCV Qualifications, the distinction of 'Honours' may be awarded to students who have obtained a grade of 9.0 or higher. The number of honours may not exceed five per cent of the students enrolled in a group in the corresponding academic year, unless the number of students enrolled is less than 20, in which case only one 'Honours' may be awarded.

Training activities

The methodologies to be used so that the students reach the expected learning outcomes will be the following:

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 TRAINING ACTIVITIES

ACTVITY	RELATIONSHIP WITH THE COURSE LEARNING OUTCOMES	METHODOLOGY	HOURS	ECTS

On-campus Class	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	Lecture of contents by the teacher, analysis of competencies, explanation, and demonstration of abilities, skills, and knowledge in the classroom. Supervised monographic sessions with shared participation.	22,50	0,90

| Practical Class | R1, R2, R3, R4, R6, R7, R8, R9, R10, R11, R12 | Lecture of contents by the teacher, analysis of competencies, explanation, and demonstration of abilities, skills, and knowledge in the classroom. 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. Application of interdisciplinary knowledge. 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. | 15,00 | 0,60 |

Seminar	R1, R2, R3, R4, R6, R8, R10, R11, R12	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. Supervised monographic sessions with shared participation.	4,50	0,18

| Group Project Presentation | R1, R2, R3, R4, R5, R6, R8, R9, R10, R11, R12 | 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.
 Set of oral and/or written tests used in the initial, formative, or summative assessment of the student.
 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. | 6,00 | 0,24 |

Tutoring	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	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.	6,00	0,24
Evaluation	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	Set of oral and/or written tests used in the initial, formative, or summative assessment of the student.	6,00	0,24
TOTAL			**60,00**	**2,40**

TRAINING ACTIVITIES OF AUTONOMOUS WORK

ACTVITY	RELATIONSHIP WITH THE COURSE LEARNING OUTCOMES	METHODOLOGY	HOURS	ECTS
Group Work	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	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.	30,00	1,20
Individual Work	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	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.	60,00	2,40
TOTAL			**90,00**	**3,60**

TRAINING ACTIVITIES OF AUTONOMOUS WORK

ACTVITY	RELATIONSHIP WITH THE COURSE LEARNING OUTCOMES	METHODOLOGY	HOURS	ECTS
Synchronous Virtual Session	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	Presentation of content by the teacher, analysis of competencies, explanation, and demonstration of skills, abilities, and knowledge in the virtual classroom. 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.	4,00	0,16

| Synchronous Session | Virtual | Practical | R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12 | 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. Problem-solving, comments, reports, to be submitted at deadlines throughout the course. Group preparation of readings, essays, problem-solving, seminars, assignments, reports, etc., for dissemination or submission. | 4,00 | 0,16 |

Synchronous Virtual Seminar and Videoconference	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	Presentation of content by the teacher, analysis of competencies, explanation, and demonstration of skills, abilities, and knowledge in the virtual classroom. Monographic sessions throughout the course, focused on current aspects and applications of the subject.	4,00	0,16
In-person Assessment	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	Set of tests, written or oral, used in the initial, formative, or summative assessment of the student.	3,00	0,12

Group Work	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	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. Group preparation of readings, essays, problem-solving, seminars, assignments, reports, etc., for dissemination or submission.	10,00	0,40
Individual Work	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	Problem-solving, comments, reports, to be submitted at deadlines throughout the course. Student study: individual preparation of readings, essays, problem-solving, seminars, assignments, reports, etc., for discussion or submission in electronic format.	60,00	2,40

TOTAL   **85,00**   **3,40**

TRAINING ACTIVITIES OF AUTONOMOUS WORK

ACTVITY	RELATIONSHIP WITH THE COURSE LEARNING OUTCOMES	METHODOLOGY	HOURS	ECTS
Individual Tutoring	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	Problem-solving, comments, reports, to be submitted at deadlines throughout the course. Group preparation of readings, essays, problem-solving, seminars, assignments, reports, etc., for dissemination or submission. Student study: individual preparation of readings, essays, problem-solving, seminars, assignments, reports, etc., for discussion or submission in electronic format.	45,00	1,80

Discussion Forums	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	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.	10,00	0,40
Continuous Assessment Activities	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	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. Participation and contributions to discussion forums related to the subject, moderated by the course instructor.	10,00	0,40
TOTAL			**65,00**	**2,60**

Description of contents

Description of content necessary for the acquisition of learning outcomes.

Theoretical content:

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