Information about the subject

Degree: Bachelor of Science Degree in Business Administration and Management

Faculty: Faculty of Legal, Economic and Social Sciences

Code: 301105 **Name:** Mathematics for Economics and the Business

Credits: 6,00 **ECTS Year:** 1 **Semester:** 1

Module: Quantitative Methods

Subject Matter: Mathematics **Type:** Basic Formation

Field of knowledge: Ingeniería y Arquitectura

Department: Economics, Business Management, and Marketing

Type of learning: Classroom-based learning / Online

Languages in which it is taught: English, Spanish

Lecturer/-s:

301A	María Aranzazu Juan Blanco **(Responsible Lecturer)**	ma.juan@ucv.es
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31GI1	Raul Cesar Volpe Bella **(Profesor responsable)**	rc.volpe@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

Knowledge of mathematical content at secondary school level

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]

R13   Be able to lead and coordinate a team, setting and communicating goals, assigning and supervising tasks, motivating and supporting team members, and evaluating the results and performance of the group. [RAG6]

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, R13	20,00%	Objective Tests
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	25,00%	Completion of Theoretical-Practical Activities
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	5,00%	Class Attendance and Participation
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	50,00%	Final Exam
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	5,00%	Participation in Synchronous Communication Activities
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	15,00%	Deliverable Activities
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	5,00%	Periodic Evaluations Through Online Questionnaires
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	5,00%	Participation in Discussion Forums
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	70,00%	Final evaluation with essay questions and practical scenarios (In-person activity)

Observations

The assessment system will be structured as follows:
·Throughout the course, objective in-person tests will be given on the content covered. The

average of the marks for these tests will account for 20% of the final mark.

·Theoretical-practical activities will also be proposed, to be carried out individually or in pairs, and must be submitted electronically via the virtual campus. The average mark will account for another 25% of the final mark. The requirements and characteristics corresponding to the submission will be indicated in due course via the platform or in the classroom. As a guideline, submissions are expected to be made once a month from October to January (both inclusive and, in the case of January, prior to the final exam).

·Classroom attendance and participation will account for 5% of the final mark, a percentage that will only be available to students who can prove at least 80% attendance at face-to-face sessions.

·The final exam will account for the remaining 50%.

·In order to pass the course, students must obtain at least 5 out of 10 points in the final in-person exam for the course in any of the exam sessions: first, second or single assessment test. If the final exam is failed, the final weighted grade for the course may not exceed 4.9 out of 10 points.

·In the second call, in addition to maintaining these requirements, students will be offered the opportunity to improve the part corresponding to continuous assessment – exclusively in relation to theoretical-practical activities – by means of a new submission or substitute activity, with special dates being proposed for this purpose. Given that the objective tests and class participation cannot be recovered in their original format due to their intrinsic characteristics, the mark obtained in this new submission or substitute activity will represent 50% of the final mark, assuming the entire weighting assigned to continuous assessment.

·In accordance with the General Regulations for Assessment and Grading of Official Courses and UCV Qualifications, single assessment is linked to the inability of students to attend face-to-face sessions. It is, therefore, an extraordinary and exceptional assessment system available to students who, for justified and accredited reasons, are unable to undergo the continuous assessment system and who request it from the professor responsible for the subject, who will expressly decide on the admission of the student's single assessment request and notify them of its acceptance or rejection. The evidence to be presented and/or the test(s) to be taken in the single assessment by the student will consist of the same theoretical and practical activities as those included in the continuous assessment - which will be expanded to take account of the readjustment in the assessment instruments - as well as the final exam. In this case, the final mark will be obtained by applying the following percentages: 50% theoretical-practical activities and 50% final exam. This criterion will apply to both the first and second exam sessions. As in the previous case, and for the second exam session, students will be offered the opportunity to improve their marks in the theoretical-practical activities by submitting a new assignment or completing a substitute activity, with special dates being proposed for this purpose. As in the other modalities, if students fail the final in-person exam, their final weighted mark for the course cannot exceed 4.9 out of 10.

·During the course, the lecturer will define and detail good practices in the use of artificial intelligence (AI) tools applied to the content. Students who violate these good practices, either in the continuous assessment tests or in the final examination, will receive a mark of 0 (zero points) in the corresponding test.

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	R1, R2, R5, R6, R7, R8, R10, R11, R12, R13	22,50	0,90
Practical Class M3	R1, R2, R5, R6, R7, R8, R10, R11, R12, R13	15,00	0,60
Seminar M4	R1, R2, R5, R6, R7, R8, R10, R11, R12, R13	4,50	0,18
Group Project Presentation M5	R1, R2, R6, R7, R8, R10, R11, R12	6,00	0,24
Tutoring M6	R2, R6, R7, R8, R10, R11, R12	6,00	0,24
Evaluation M7	R2, R6, R7, R8, R10, R11, R12	6,00	0,24
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Group Work M9	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	R1, R2, R5, R6, R7, R8, R10, R11, R12, R13	4,00	0,16
Synchronous Virtual Practical Session M12	R1, R2, R5, R6, R7, R8, R10, R11, R12, R13	4,00	0,16
Synchronous Virtual Seminar and Videoconference M13	R1, R2, R5, R6, R7, R8, R10, R11, R12, R13	4,00	0,16
In-person Assessment M17	R2, R6, R7, R8, R10, R11, R12	3,00	0,12
Group Work M19	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	10,00	0,40
Individual Work M20	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13	60,00	2,40
TOTAL		**85,00**	**3,40**

ASYNCHRONOUS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Individual Tutoring M14	R1, R2, R5, R6, R7, R8, R10, R11, R12	50,00	2,00
Discussion Forums M15	R2, R6, R7, R8, R10, R11, R12	5,00	0,20
Continuous Assessment Activities M16	R1, R2, R3, R4, R5, R6, R7, R8, 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
Linear Algebra	Matrix calculus: Basic operations, determinants, ranks.Systems of linear equations.Diagonalisation of matrices.Applications of linear algebra to economics: discrete dynamic models, Markov processes.Appendix. Vector spaces. Linear applications. Diagonalisation.
Calculus	Real function of real variable. Limits, continuity, derivability, optimisation. Review.Real function of several variables. Introduction. Differentiation. Economic interpretation. Optimisation.Real function of real variable. Integration. Application to Calculus Economics: continuous dynamic models, introduction to differential equations.

Temporary organization of learning:

Block of content	Number of sessions	Hours
Linear Algebra	12,00	24,00
Calculus	18,00	36,00

References

Basic bibliography

·Calderón Montero, S., & Rey Borrego, M. L. (2012). *Matemáticas para la economía y la empresa*. Ediciones Pirámide.

·ISBN: 978-84-368-2685-2

·Edición: 1.ª, 2012. Idioma: español.

·Sydsaeter, K., Hammond, P., Strøm, A., & Carvajal, A. (2016). *Matemáticas para el análisis económico* [Traducción al español de *Essential Mathematics for Economic Analysis*]. Pearson.

·Si se usa la versión inglesa original: Sydsaeter, K., Hammond, P., & Strøm, A. (2016). *Essential Mathematics for Economic Analysis* (2.ª ed.). Pearson Education. ISBN: 978-0273681809.

·Rodríguez Ruiz, J. (2018). *Álgebra lineal. Teoría*. Ediciones Académicas (EDIASA).

·ISBN: 978-84-9469805-7

·Lugar de publicación: Madrid, España.

·García Llamas, C., Matilla García, M., & Rodríguez Ruiz, J. (2013). *Matemáticas para los grados en economía y empresa. Cálculo diferencial. Teoría.* Ediciones Académicas (EDIASA).

·ISBN: 978-84-9247789-0

·Lugar de publicación: Madrid, España.

Further Reading

·Rodríguez Ruiz, J., Matilla García, M., & García Llamas, C. (2013). *Matemáticas para los grados en economía y empresa: Álgebra lineal. Ejercicios y problemas resueltos.* Ediciones Académicas (EDIASA).

·ISBN: 978-84-9247789-0 (la misma referencia de la editorial)

·Lugar de publicación: Madrid, España.

·Herrero de Egaña, A. (2011). *Cálculo para empresarios y economistas (Matemáticas II).* Ediciones Académicas (EDIASA).

·Calvo, C., & Ivorra, C. (2012). *Las matemáticas en la economía a través de ejemplos en contextos económicos.*Tirant lo Blanch.

·Larson, R., & Edwards, B. H. (2010). *Cálculo 2 de varias variables*. McGraw-Hill.