UNIVERSIDAD DE CASTILLA - LA MANCHA
GUÍA DOCENTE

1. General information

Course: MATHEMATICS FOR BUSINESS I

Type: BASIC

Degree: 329 - UNDERGRADUATE DEGREE PROGRAMME IN BUSINESS MANAGEMENT AND ADMINISTRATION (TA)

Center: 15 - FACULTY OF SOCIAL SCIENCES AND INFORMATION TECHNOLOGIES

Year: 1

Main language: Spanish

Use of additional languages:

Web site:

Code: 54304

ECTS credits: 6

Academic year: 2020-21

Group(s): 60

Duration: First semester

Second language:

English Friendly: Y

Bilingual: N

Lecturer: **ALVARO MARTINEZ PEREZ** - Group(s): **60**

Building/Office	Department	Phone number	Email	Office hours
Despacho 2.9	ANÁLISIS ECONÓMICO Y FINANZAS	926051370	alvaro.martinezperez@uclm.es	First semester: Tuesdays from 9 to 11 and from 16 to 18. Fridays from 9 to 11 and from 14 to 15. Second semester: Thursday from 9:30 to 11:30 and from 16 to 18 and Fridays from 9 to 11 and from 15 to 17.

2. Pre-Requisites

Obligatory: Not established

Recomended: Since mathemtics is a subject where concepts and proceedings are all related with each other, it would be convenient to have a solid basis from high school. In particular, it is convenient the knowledge of;

Algebraic expresions: integer algebraic operations; Ruffini's rule; factor decomposition of algebraic expresions; fraction simplification; basic algebraic structures.

·Powers

·Radicals: Reduction to common index radicals; fractial exponents, extraction e introduction of factors; operations with radicals.

·Inequalities: Geometric resolution.

-Progressions: arithmetic progressions, geometric prograssions.

·Real valued functions: Domain and continuity; derivability and diferenciability: graphic representation of functions.

·Trigonometry: angles; trigonometric functions; graphic respresentation of trigonometric functions; trigonometric equivalences;trigonometric inverse functions.

·Logarithms and exponential functions.

·Introduction to elemental derivation.

3. Justification in the curriculum, relation to other subjects and to the profession

Mathematics I for business is parte of the *Cuantitative Methods for Business* modulus. Therefore, it is an essential subject for many others subjects in the Degree.

Mathematical concepts never appear isolated but based on previous definitions. Therefore, it is difficult to understand any content without understanding the previous lesson. Thus, the success in studying mathematics is based on having a general vision of the subject giving context to each new concept which can not be learnt isolated.

The first part, devoted to linear algebra, gives the basi knowlege for a great part of economic theory models. The second part, devoted to one variable calculus will be the basis for the basic functions used in enocomy such as offer and demand functions.

It must be considered that mathematics are an instrumental subject for the rest of specidic subjects in the degree since it is applied in many areas of business and economy. However, although is not considered as a pure object of study, the subject is developed with all due rigour and formality to allow the students to pursue futur PhD studies in economics.

In relation with the profession it is worth noting that the aim of this subject is to know the models and techniques of cuantitative analisys in business including the models for decission making in business and economic forecast.

4. Degree competences achieved in this course

Course competences

Code	Description
E07	Understand the economic environment as a result and application of theoretical or formal representations on how the economy works. To do so, it will be necessary to be able to understand and use common handbooks, as well as articles and, in general, leading edge bibliography in the core subjects of the curriculum.
E11	Know the workings and consequences of the different economic systems
	Possession of the skills needed for continuous, self-led, independent learning, which will allow students to develop the learning

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Know the tools and methods for the quantitative analysis of the company and its environment, including models for business decision making as well as economic forecast models.

Work out problems in creative and innovative ways.

Additional outcomes

1.- Being capable of proposing, studying and solving a linear system. To do this: 1.1.- Knowing the different types of matrices and operate with them. 1.2.- Being able to calculate the determinant and the inveres of a matix. 1.3.- Proposing linear systems from real situations and deciding if the system has a solution or not. In case it has a solution, being able to find it. 2.- Given a linear map representing certain economic sitution, being able to find the corresponding matrix and, if possible, present it in the most simple way (diagonal). To do this: 2.1.- The student should be familiar with the vector space Rn and be capable of givin a base for it. 2.2.- The student will know the different linear maps and how to operate with them. 2.3.- Stablish an isomorphism between linear maps and matrices. 2.4.- Being able to calculate the eigenvalues and eigenvectors of a matrix. 2.5.- Finding the diagonalization of a matirx. 3- Computing cuadratic forms to optimize functions. To do this: 3.1.- Knowing the normed space. 3.2.- Studying the sign of a cuadratic form in Rn and also when restricted to a subspace. 4.- Being able to compute the sum of an infinite series of real numbers. To do this: 4.1.- Knowing about sequences of real numbers and having tools to compute their limit. 4.2.- Defining series from sequences and computing their sum. 5.- Being able to study a real valued function with real variable. To do this: 5.1.- Being able to solve limits, continuity and derivability of a function. 5.2.- Knowing the procediure for graphic representation of functions.

6. Units / Contents

Unit 1: Basic elements of linear algebra

Unit 2: Rn vectorial space

Unit 3: Linear maps and associated matrices

Unit 4: Matrix diagonalization

Unit 5: Cuadratic forms

Unit 6: Real numbers: sequences and series

Unit 7: Real valued functions of a real variable

ADDITIONAL COMMENTS, REMARKS

Ths syllabus contains two different parts.

Parte I: Linear Algebra. (Units 1-5), note that cuadratic forms are not linear.

Parte II: Single variable calculus (Temas 6 y 7)

The contents of this teaching guide have been agreed by the mathematics area and therefore are similar in every campus in the UCLM where this degree is offered.

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E07 E11	1.33	33.25	N	-	Teaching the subject by lecturer (MAG)
Class Attendance (practical) [ON-SITE]	Problem solving and exercises	E07 E11 G01	0.67	16.75	N	-	Worked example problems and cases resolution by the lecturer and the students (PRO)
Other on-site activities [ON-SITE]	Assessment tests	E07 E11 G01	0.1	2.5	Y	N	Other evaluation activities (EVA)
Progress test [ON-SITE]	Assessment tests	E07 G01	0.1	2.5	Y	N	Test on Linear Algebra (EVA)
Final test [ON-SITE]	Assessment tests	E07 G01	0.1	2.5	Y	Y	Final test of the complete syllabus of the subject (EVA)
Other off-site activity [OFF-SITE]	Problem solving and exercises	G01	0.2	5	N	-	Self study (EST)
Study and Exam Preparation [OFF-SITE]	Self-study	E07 E11 G01	1.4	35	N	-	Self study (EST)
Group tutoring sessions [ON-SITE]	Group tutoring sessions	E07 G01	0.1	2.5	N	-	Individual or small group tutoring in lecturer's office, classroom or laboratory (TUT)
Other off-site activity [OFF-SITE]	Self-study	E07 G01	2	50	N	-	Self study (EST)
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4				Total class time hours: 60	
		Total credits of out of class work: 3.6				Total hours of out of class work: 90	

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Progress Tests	10.00%	0.00%	Progress Test of the Linear Algebra part.
Other methods of assessment	10.00%	0.00%	Non-compulsory activity that can be retaken. To be carried out before end of teaching period

Final test	80.00%	100.00%	Final test of the whole syllabus.
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

Final test: The final test includes all the lessons in the syllabus (lessons 1 to 7: Linear Algebra and Single vairable Calculus) and gives a maximum of 8 points to the final grade whenever a minimum of 40% is achieved.

Progress test: this evaluation activity on Linear Algebra gives a maximum of 1 point to the final grade of the course.

Other evaluation activities: These self-evaluations or cooperative activities or case resolutions, etc give a maximum of 1 point to the final grade of the course.

Note: In case that the final exam score is less than a 40%, the continous evaluation will not be considered and the final grade of the course will be the grade of the final exam.

Aditional note: The rules of the Mathematics Area for the realization of any exam (partial, ordinary or extraordinary) are the following: it is forbiden to carry and/or use any cell phone (or calculator) during the exam. In case a student carries and/or uses a cell phone (or calculator) during the exam, will immediately fail with a 0 score in base of Article 9 of the Student Evaluation Regulations.

Non-continuous evaluation:

The final exam will consist of the necessary tests (written or oral) to validate the competencies on the subject.

Specifications for the resit/retake exam:

Final retake exam: it will be a test including the whole syllabus (lessons 1 to 7: Linear Algebra and Single Variable Calculus) for all students and it will give a masimum of 9 points to the final grade for those whe reach at least a
40%.

Progress test: it is recovered in the final retake exam.

Other evaluation activities: these self-evaluations or cooperative activities or case resolutions, etc keep the score in the extraordinary convocatory.

Note: As in the ordinary convocatory, if the final exam score is less than a 40%, the continous evaluation will not be considered and the final grade of the course will be the grade of the final exam.

Specifications for the second resit / retake exam:

It will be a final test which gives the 100% of the final grade.

Note: The rules of the Mathematics Area for the realization of any exam (partial, ordinary or extraordinary) are the following: it is forbiden to carry and/or use any cell phone (or calculator) during the exam. In case a student carries and/or uses a cell phone (or calculator) during the exam, will immediately fail with a 0 score in base of Article 9 of the Student Evaluation Regulations.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	33.25
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	16.75
Other on-site activities [PRESENCIAL][Assessment tests]	2.5
Progress test [PRESENCIAL][Assessment tests]	2.5
Final test [PRESENCIAL][Assessment tests]	2.5
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	35
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2.5
Other off-site activity [AUTÓNOMA][Self-study]	50

Global activity

Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	33.25
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	16.75
Other on-site activities [PRESENCIAL][Assessment tests]	2.5
Progress test [PRESENCIAL][Assessment tests]	2.5
Final test [PRESENCIAL][Assessment tests]	2.5
Other off-site activity [AUTÓNOMA][Problem solving and exercises]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	35
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2.5
Other off-site activity [AUTÓNOMA][Self-study]	50
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Anton, H	Introducción al álgebra lineal	Limusa		ISBN: 978-968-18-631	2010	
Arvesú Carballo, Jorge	Problemas resueltos de álgebra lineal	Thomson		84-9732-284-3	2005	
Barbolla, R. y Sanz, P.	Algebra lineal y teoría de matrices	Prentice Hall			2001	

Blanco García, S. García Pineda, P. y Pozo García, E.	Matemáticas empresariales I. Enfoque teórico y práctico. Vol. 2. Cálculo	AC Madrid	ISBN: 84-9732-172-3	2002
Blanco García, S.; García Pineda, P. y Pozo García, E.	Matemáticas empresariales I. Enfoque teórico y práctico. Vol I. Álgebra lineal.	AC Madrid	ISBN: 84-9732-171-5	2002
Burgos Román, J.	Álgebra Lineal	McGraw-Hill	ISBN: 84-481-0134-0	1997
Calvo, M. E. y otros	Problemas resueltos de matemáticas aplicadas a la economía y la empresa.	AC		2003
Cancelo, J. R., López Ortega, J. y otros.	Problemas de álgebra lineal para economistas.	Tebar Flores		1995
Cámara Sánchez, A.	Problemas resueltos de matemáticas para economía y empresa.	Thomson AC	ISBN: 978-84-9732-17	2007
García, A., García, F. y A. Gutiérrez.	Cálculo I. Teoría y Problemas de Análisis Matemático en una Variable.	Clagsa		1998
Gutiérrez, S.	Álgebra Lineal para la Economía.	AC		2002
Jarne, G. ; Perez-Grasa, I. ; Miguillón, E.	Matemáticas para la economía: álgebra lineal y cálculo diferencial.	McGraw-Hill	ISBN: 84-481-1197-4.	2004
López, M. y Vegas, A.	Curso básico de matemáticas para la economía y la dirección de empresas I.	Pirámide		2001
Stewart, J	Cálculo en una variable.	Thomson		2001
Sydsaeter, K.	Matemáticas para el análisis económico.	Prentice Hall	ISBN: 0-13-240615-2.	2006
Vignerón Tenorio A. y Beato Sirvent, J.	Matemáticas básicas para la Economía y la Empresa.	Servicio de Publicaciones de la Universidad de Cádiz		2006