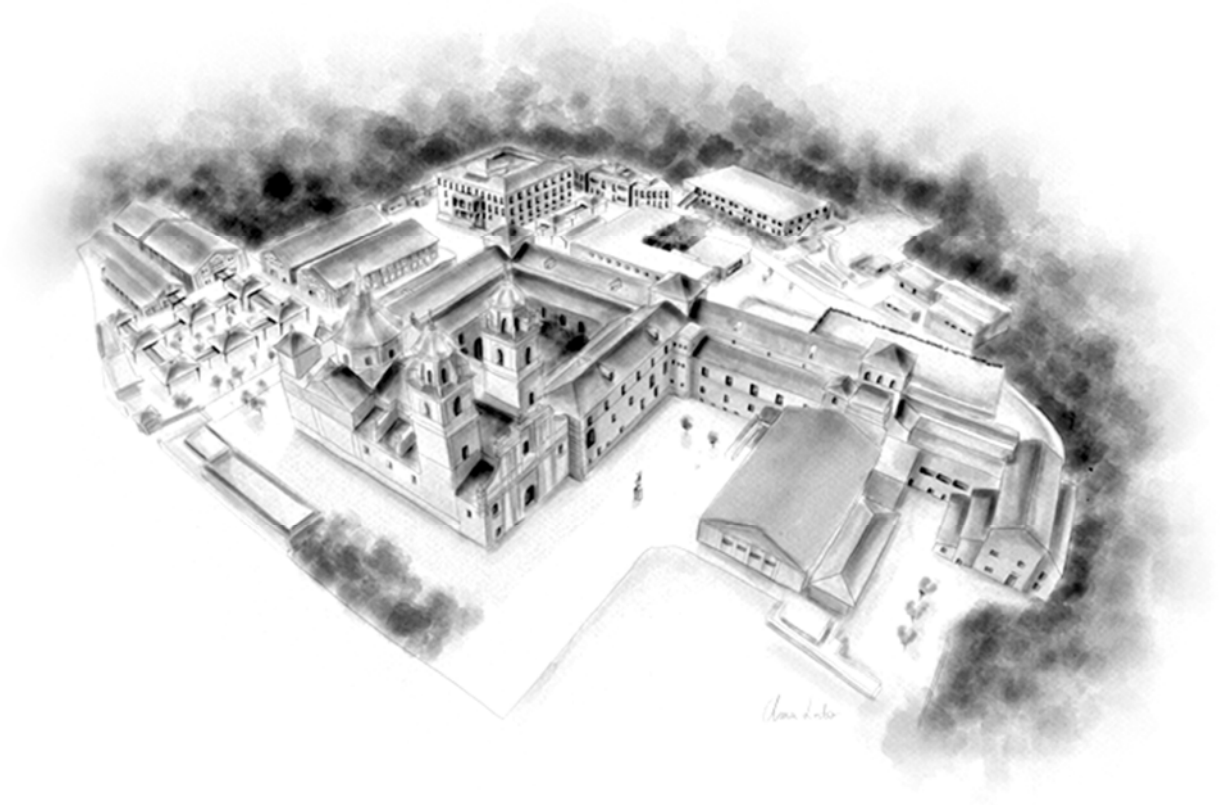
Teaching Guide 2017/2018

Mathematics for Business I

Bachelor Business Administration

Face-to-face mode



Contents

Mathematics for Business I

Module: **Quantitative methods**

Field: **Mathematics**

Character: **Basic Training** .

ECTS: **6 ECTS**.

Time period: **First Course, first semester**

Teacher: **Vita Zhukova**

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Student's attention timetable/ office hours: **Thursday 12.00h**

Module coordinator teacher: **Mª. Concepción Pérez Cárceles**

Brief Description

"Mathematics for Business I" covers broad set of concepts, theories and mathematical techniques of linear algebra needed to be able to model and solve business problems which are the major concern of this course. In this course the student will not only acquire the capacity for analysis and reasoning, but also specific knowledge and skills.

Previous requisites

In order to optimize the training results, the student should have a solid background in subject of linear algebra form Secondary Education, successions of real numbers and calculation in a variable to introduce important concepts about algebra and go in-depth in differential calculus.

Objectives

1. Enable student to understand all matters of quantitative character of the study plan
2. Learn the mathematical language in which economic models are expressed
3. Learn to model business problems in mathematical terms
4. Solve problems
5. Interpret mathematical solutions in economic terms
6. Get used to the deductive method

Competences and training results

Cross curricular subjects

(T1) Ability to analyze and synthetize

(T2) Ability to organize and plan

(T3) Oral and written communication in native language

(T6) Ability to manage information

(T7) Problem solving

(T8) Decision making

(T14) Critical Reasoning

(T16) Autonomous learning

(T22) Motivation for quality

(**T24**) Reflection ability

(**UCAM1**) Be able to express oneself correctly in the disciplinary scope

Specific Competences

(**E12**) Know and apply the basic concepts of the mathematical analysis

(**E19**) Acquire the ability to apply the knowledge in practice

(**E37**) Identify and use mathematical and statistic tools

(**E57**) Communicate fluently within the field of work and work in teams

Training results

- Understand, reason and systematize mathematics contents.
- Manage and organize the mathematical information acquired during the learning process.
- Express oneself correctly with suitable mathematical terminology, oral or written, in the native language.
- Organize and know how to handle information from different contexts related to the mathematical scope.
- Generate learning abilities to enable the student to follow subsequent training in the mathematical scope with high autonomy standards.
- Acquire the necessary abilities to solve mathematical problems.
- Decide, in a comprehensive and critical way, among the different options in the mathematical analysis scope.
- Issue sentences and take up a stance in a critical way facing the different situations that set out mathematical problems.
- Manage the learning process in the proactive way in the mathematics scope.
- Value the significance of the suitable fulfillment of the work when it comes to solve mathematical challenges to face.
- Think in a critical and reasonable way questions related to the mathematical analysis field.

- Use suitable mathematical terminology and orthographic and grammar rules in oral and written language.
- Have and understand knowledge of mathematics supported by text books with some aspects that involve knowledge at the vanguard in this field of study.
- Know how to apply the matrix language and the operations to the situations dealing with data structured in charts and graphics.
- Interpret qualitatively and quantitatively the local properties of functions that represent situations from the business world.
- Know and know how to apply differential calculus in both variables for its use in optimization problems from real situations of economic nature.
- Apply elementary techniques for the calculation of primitive functions and its later use in the calculations of areas, volumes and distributions of probability.
- Know and apply mathematical knowledge to the practice through the elaboration and defense of well-built and reasoned arguments.
- Use algebraic language properly and choose algebraic tools to solve problems.
- Know how to construe critically solutions obtained.
- Analyze qualitatively and quantitatively the local and global properties of a function describing a real situation, from common phenomena in business.
- Have a good command of derivatives calculus and apply the differential calculus techniques to obtain the optimum values in problems related to economic sciences.
- Analyze and interpret the results obtained in the context of the problem formulated.
- Infer and calculate integrals defined, to relate them with: area under a cure, function of distribution, etc.
- Apply properly the concepts and knowledge of linear algebra acquired.
- Apply properly the concepts and knowledge of differential and integral calculus acquired.
- Understand and apply properly the basic concepts and knowledge of mathematical optimization.
- Solve mathematical problems in work teams.
- Communicate effectively and properly information, ideas, problems and solutions in the mathematical field.
- Use a logical structure and write con orthographic correction.
- Use correctly mathematical terminology in the tasks.

Methodology

Methodology	Hours	Hours of work Face-to-face	Hours of work Non Face-to-face
Lectures (65%)	39	60 hours (40%)	
Practice: workshops (8%)	4,8		
Assessment (7%)	4,2		
Tutorials (20%)	12		
Personal study (45%)	40.50		90 hours (60%)
Tasks (30%)	27		
Practical Lectures (15%)	13.50		
Bibliographic search (10%)	9		
TOTAL	**150**	**60**	**90**

Contents

Theme 0: Course outline and Introduction

Theme 1: Vector Spaces

1.1. Definition of vector space. Properties

1.2. Linear combination: Linear Dependence and Independence.

1.3. Generator system and vector space basis.

1.4. Properties. Dimensions.

1.5. Case study

Theme 2: Matrix: Matrix Calculus.

2.1. Matrix: Definition

2.2. Types of Matrix.

2.3. Matrix operations.

2.4. Determinant of a square matrix: Definition and calculation.

2.5. Properties of the determinants

2.6. Inverse matrix: Calculation.

2.7. Matrix rank. Rank operations.

2.8. Partitioned matrix. Operations.

2.9. Case study

Theme 3: Linear equations systems

3.1. Definition.

3.2. Matrix representation.

3.3. Linear system solutions.

3.4. Rouché-Frobenius theorem

Theme 4: Linear Applications

4.1. Concept of linear application: Properties.

4.2. Nucleus of a linear application.

4.3. Linear application image. Linear application rank

4.4. Theorem of the nucleus-image dimension.

4.5. Classification of linear applications.

4.6. Case study.

Theme 5: Real Matrix diagonalization.

5.1. Eigenvalues and eigenvectors.

5.2. Real matrix diagonalization.

5.3. Calculation of the ith counterparty of a diagonalizable matrix.

5.4. Diagonalization of symmetric matrixes.

5.5. Case study

Theme 6: Quadratic real forms.

6.1. Definition.

6.2. Classification of quadratic forms.

6.3. Diagonal expressions.

6.4. Study of the sign through the principal minors of the associated matrix.

6.5. Quadratic real forms with restrictions

6.6. Case study.

Connection with other subjects of the study plan

The concepts, theories and mathematical techniques of linear algebra are very useful for modelization and business problem solving, hence they are basic contents in other subjects: Microeconomics, Macroeconomics, Financial mathematics, Financial Management, Accounting

Assessment/ Ranking system

For students registered for continuous evaluation:

- Theory-practice part: 80% of total grade

The theory-practice part of the subject will be assessed in two qualifying partial exams/midterms which count for 30% the first one and 50 % the second one. Students must pass both midterms with at least 4 points out of 10.

- Student's involvement: 20%

The assessment is based on students' attendance and active participation in class. Student are encouraged to submit or present solved problem sets, work in groups or individually and take part in class discussions and debate forums.

For the students registered in recovery

- The subject will be assessed in one 100% grade unique final exam.

*NOTE: Students' attendance is mandatory for at least 60% of classes.

Ranking system

According to ***el art.5*** of ***RD 1125/2003,*** students will be rated by means of the numerical scale from 0-10, with one decimal, to which a qualitative grade can be added:

Fail (SS) 0-4,9

Pass (AP) 5,0-6,9

Good (NT) 7,0-8,9

Distinction (SB) 9,0-10

The "Honors" mention can be awarded to those students with a degree of 9,0 or higher. This cannot be awarded to more than 5% of the students registered in a subject in each academic year, unless the number of students registered is less than 20, when there will be awarded only one mention.

Bibliography and reference sources

Basic Bibliography

- Sydsaeter, K., Hammond, P., Strom, A., and Carvajal, A. (2016). *Essential Mathematics for Economic Analysis*. 5/E. Ed. Pearson. 5/E

- Sydsaeter, K., Hammond, P., Seierstad, A., and Strom, A. (2008). *Further Mathematics for Economic Analysis*. 2/E. Ed. Pearson.

Complementary Bibliography

Webs related

There are no webs related

Recommendations for the study

It is highly recommended the daily study of the subject content. This will help student to be able to solve doubts and questions before going into the further part of the course material.

Didactic Material

It will be necessary to have a PC with all the necessary programs installed (text editor, spreadsheet, presentation tools, etc.) We also recommend students to use memory devices (USB, CDs or DVDs) to make easier the interchange of information in presentations such as Power Point, exercises, case study, etc., during the face-to-face classes. We also recommend the use of calculator and access to the Internet.

Tutorials

Academic tutorial:

The aim of the tutorials is to consolidate knowledge and abilities taught in the class, help to solve problems and doubts students are concerned with. Moreover, tutorials hours are devoted to carry out additional work and tasks which contribute to the understanding of the subject methodology and systems of assessment.

Personal Tutorial:

The university also has a Special Team that has tutorials with the students enrolled in the degree. All students registered in UCAM have a personal tutor from the Special Tutors Team, when they register for the first time in the university, hence the student has this accompaniment during the complete university period. Criteria and aspects can be consulted in:

http://www.ucam.edu/servicios/tutorias/preguntas-frecuentes/que-es-tutoria.