

# Mathematics I

Code:1EC104 Acronym:MATI

Keywords	
Classification	Keyword
OFICIAL	Mathematics

## Instance: 2019/2020 - 1S

Active?Yes

Responsible unit:Agrupamento Científico de Matemática e Sistemas de Informação

Course/CS Responsible:Bachelor in Economics

## Cycles of Study/Courses

Acronym	No. of Students	Study Plan	Curricular Years	Credits UCN	Credits ECTS	Contact hours	Total Time
LECO	65	Bologna Syllabus since 2012	1	-	6	63	162

## Teaching Staff - Responsibilities

Teacher	Responsibility
Paulo José Abreu Beleza de Vasconcelos	

## Teaching - Hours

Theoretical and practical :4,50

Type	Teacher	Classes	Hour
Theoretical and practical	Totals	6	27,00
	Alexandra Patrícia Horta Ramos		4,50
	José Abílio de Oliveira Matos		4,50
	Sofia Balbina Santos Dias de Castro Gothen		9,00
	Paulo José Abreu Beleza de Vasconcelos		9,00

## Teaching language

Portuguese

## Objectives

Students will learn how to study real multivariable functions and how to use this in decision making. The students will namely be able to find the actions (i) that maximize the results, given a restriction on the factors used and (ii) that minimize the factors given an objective, through optimization with and without constraints. The depth of the study will be that which is appropriate in a degree in Economics.

Applications to Management and Economics will be provided when appropriate.

Students will also be able to do mathematics on a computer.

## Learning outcomes and competences

The students will be endowed with the technical tools indispensable for a successful career in Management.

Students will learn how to study real multivariable functions and use that knowledge in the context of optimization problems.

Students will also gain the skills to do mathematics on a computer.

Through work in groups to solve a challenge and present their results the students will achieve the skills of work in group as well as oral presentations' skills that are an indispensable asset for a later professional activity.

## Working method

Presencial

## Program

Study of real functions of several real variables:

- Graphs and domain;
- Limits and Continuity;
- Partial derivatives; differentiable functions; gradient; tangent plane, the chain rule;
- Differentiability; approximation of functions, Taylor formula;
- Homogeneous functions;

- The Implicit Function Theorem and study of functions defined implicitly;
- Maxima and minima of functions;
- Lagrange multipliers for constrained optimization.

## Mandatory literature

Marsden, Jerrold E.; Vector calculus. ISBN: 978-1-4292-2404-8

## Complementary Bibliography

Cerqueira, António de Melo da Costa; Funções reais definidas em  $\mathbb{R}^n$ . ISBN: 972-578-130-9

## Teaching methods and learning activities

A mixture of lecture and example class will be used as appropriate. Besides the classes there is an online course in the e-learning platform of the university. This includes chats (for obtaining help with the teaching staff), auto-evaluation for assessing the progression of the student's individual learning process, and all the materials needed in class.

During the academic year 2018-19, the chat is open on Mondays from 2.30-3.30pm. At the same time, the teaching staff is available in room 512.

Once a week there is a Lab session in class where students work in groups to solve a challenge and present their results.

## Software

Maxima

## Evaluation Type

Distributed evaluation with final exam

## Assessment Components

Designation	Weight (%)
Exame	100,00

<b>Total:</b>	<b>100,00</b>
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## Amount of time allocated to each course unit

Designation	Time (hours)
Estudo autónomo	99,00
Frequência das aulas	63,00
<b>Total:</b>	<b>162,00</b>

## Eligibility for exams

One final exam or two tests, such that each test should have a minimum grade of six.

Students who wish may still get a maximum bonus of one (1) value to add to the final score by performing small tasks (non-compulsory assessments). There will be a total of five tasks along the semestre and the student will obtain a bonus of 0,25 points after performing correctly each of the tasks, and the best four tasks are used for calculating the total bonus. The students do not have to complete all the tasks. The tasks may require the use of computers.

The bonus does not apply to special exam seasons.

Assessment for students with special status may be made via oral exams.

## Calculation formula of final grade

To the mark of the final exam or average of the tests, such that no test may have a mark below six (6.0) for approval.

The student may add up to an additional point by completing the tasks, if the student has completed the two tests or the normal exam.

## Examinations or Special Assignments

The bonus points are obtained by performing tasks.

## Special assessment (TE, DA, ...)

In accordance with the RAC.

## Classification improvement

In accordance with the RAC.

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