COURSE DATA

Data Subject	
Code	34285
Name	Mathematics
Cycle	Grade
ECTS Credits	6.0
Academic year	2018 - 2019

Study (s)

Degree	Center	Acad. year	Period
1207 - Degree in Optics and Optometry	Faculty of Physics	1	First term

Subject-matter

Degree	Subject-matter	Character
1207 - Degree in Optics and Optometry	2 - Mathematics	Basic Training

Coordination

Name	Department
CARRERAS MARTINEZ, FRANCISCO	205 - Geometry and Topology

SUMMARY

The Mathematics course fits into the basic science education every student of Optometry should before fully entering into the issues specific to the degree. The subject must, first, fill gaps in mathematical knowledge of many students, who have come to the university without studying mathematics in the second year of high school. Consistently with this, the course begins with a preamble in which issues such as numbers and vector operations, elementary functions, graphs of functions and their interpretation,... are recalled. On the other hand, basic math skills should be given for all experimental science: a) introduction to matrices and discussion and resolution of systems of linear equations, b) introduction to the geometry of plane and space and the study of conics, which is of particular importance for this degree, c) the differential and integral calculus needed to see how math is involved in issues related to speed, slope, the determination of maxima and minima, measuring areas ...

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

1207 - Degree in Optics and Optometry

- To demonstrate basic knowledge of geometry and mathematical analysis.
- To know complex numbers, vectors and matrices.
- To know the principles of function analysis.
- To know the elements of calculus of derivatives and integrals.

LEARNING OUTCOMES

- Ability of mathematical thinking.
- Using mathematical language.
- Learn basic mathematical functions graphically.
- Knowing to discuss the existence of solutions of a system of linear equations and to calculate them.
- Acquire minimum skills of differential and integral calculus.
- Become familiar with the geometry of conics.

DESCRIPTION OF CONTENTS

1. Introduction

1.1 The numbers: N, Q, R.
1.2 The plane R^2. Equation of a line in the plane. Slope of a line. Distance in the plane.
1.3 Functions. Graph of a function. Inverse of a function. Review of elementary functions.

2. Vector spaces, matrices, systems of linear equations

2.1 The vector space Rn. Vector subspaces.
2.2 Linear dependence and independence. Bases. Coordinates of a vector.
2.3 Matrices. Matrix operations.
2.4 Rank of a matrix. Determinants. Inverse matrix.
2.5 Systems of linear equations.

3. Geometry of the plane and space

3.1 The affine space Rn. Canonical reference system.
3.2 Affine varieties. Parallel linear varieties.
3.3 Equations of an affine variety. Particular cases.
3.4 Scalar product. Vector product.

4. Real functions

4.1 Limits of sequences.
4.2 Limits of functions.
4.3 Continuous functions and their graphs

5. The derivative and its applications

5.1 The derivative of a function of one variable.
5.2 Calculation of derivatives. Chain rule.
5.3 The derivative of a function as the slope of its graph.
5.4 Critical points of functions of one variable.
5.5 Local maxima and minima.
5.6 Global maxima and minima.
5.7 Concavity and convexity. Interpreting and drawing graphs.

6. The integral of functions of one variable

6.1 Primitives or antiderivatives.
6.2 Some methods of integration.
6.3 Definition of definite integral.
6.4 Relationship to the primitive. Barrows rule.

7. Conics

7.1 General concept of a conic.
7.2 Ellipse. Parabola. Hyperbola.
7.3 Determination of the geometric elements of a conic.
7.4 Brief description of quadrics.

8. An introduction to functions of several variables

8.1 Graphic representation.
8.2 Partial derivatives. Gradient vector.
8.3 Critical points of a function of two variables.

9. Complex numbers

9.1 Definition. Operations with complex numbers.
9.2 Moivre formula.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	45,00	100
Tutorials	15,00	100
Development of individual work	10,00	0
Preparation of evaluation activities	20,00	0
Preparing lectures	45,00	0
Preparation of practical classes and problem	15,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Theoretical classes with non-mandatory attendance. Student participation will be encouraged, trying to correct two defects often seen in students of the first course: fear to ask and of being ridiculed for giving a false answer.
Practical classes for problem-solving and concept learning with compulsory attendance.

EVALUATION

The evaluation will be implemented through:

- An objective test at the end of the semester, consisting of both theoretical and practical questions and problems. The rate at which this test will influence the final grade will be 80%.
- Presentation of some work proposed to each student throughout the course. The extent to which the qualification of this work will influence the final grade is 20%.

- To qualify for this rating system it will be necessary to have attended at least 80% of formal tutoring. Failure to meet this requirement, the final rating will be that of the final exam.

REFERENCES

Basic

- 10.1 Referencias Básicas

Referencia b1: G.B. Thomas, R.L. Finney. "Cálculo con Geometría Analítica", 1987, Addison-Wesley Iberoamericana, Wilmington

Referencia b2: J. Stewart: Cálculo : conceptos y contextos, Tercera Edición, Cengeage Learning Ed. 2006