COURSE DATA

DATA SUBJECT

Code: 34285
Name: Mathematics
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1207 - Degree in Optics and Optometry	Facultat de Física	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1207 - Degree in Optics and Optometry	Mathematics	BASIC

COORDINATION

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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

It is not needed an additional knowledge to the Mathematics taught at the Secondary School.

COMPETENCES / LEARNING OUTCOMES

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To demonstrate basic knowledge of geometry and mathematical analysis.

To know complex numbers, vectors and matrices.

To know the elements of calculus of derivatives and integrals.

To know the principles of function analysis.

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

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	15,00
Theory	45,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	10,00
Independent study and work	0,00
Preparation of lessons	60,00
Preparation for assessment activities	20,00
Resolution of case studies	0,00
Total hours	**90,00**

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 carried out taking into account the following tests, all of which will be graded out of a maximum of 10 points.

Written Exam (WE): Consisting of an exam consisting of both theoretical-practical questions and problems.

The minimum grade to pass this part is 4.0.

Continuous Assessment (CA): Presentation of some works proposed to each student throughout the course.

In order to be considered for the grade CA it is necessary to have attended at least 80% of the classes of regulated Tutoring.

The final grade (P) of the first call will be the maximum between P1 = 0.8 WE + 0.2 CA and P2 = 1.0 N1 .

In the second call, the written exam is compulsory, and the grade of Continuous Assessment obtained in the first call is kept.

The formula for the calculation of the final grade is also kept.

REFERENCES

- G.B. Thomas, R.L. Finney. "Cálculo con Geometría Analítica", 1987, Addison-Wesley Iberoamericana, Wilmington
- J. Stewart: Cálculo : conceptos y contextos, Tercera Edición, Cengeage Learning Ed. 2006