

26405 - Mathematics

Syllabus Information

Academic year: 2023/24

Subject: 26405 - Mathematics

Faculty / School: 100 - Facultad de Ciencias

Degree: 296 - Degree in Geology

588 - Degree in Geology

ECTS: 8.0

Year: 1

Semester: Annual

Subject type: Basic Education

Module:

1. General information

The general objective of the subject is the acquisition of basic concepts of Infinitesimal Calculus and Linear Algebra, which will serve as a basis and tool for Geology and other related disciplines. It is a review (extended) of the mathematical concepts of Baccalaureate

As it is developed throughout the term, it allows to cover the main objectives of the subject with pause and time for the student to assimilate the most important fundamentals and concepts.

Computer exercises initiate the student in the scientific programming of certain problems seen in theory, in such a way that solutions are obtained automatically, which would be unmanageable if the calculations were done manually or with a calculator.

2. Learning results

- To be able to analyse and solve with ease mathematical problems of numerical and conceptual content
- To know the basic concepts of differential calculus and be able to solve problems of elementary function theory and optimization. To approximately solve nonlinear equations and obtain analytical curves from laboratory data by means of interpolation techniques.
- To calculate elementary integrals and know the main methods of integration. -To apply the calculus of integrals to obtaining areas and volumes of solids of revolution. -To numerically approximate the value of definite integrals.
- To know the basic concepts of Linear Algebra. -To solve linear systems of equations, handle matrix algebra, calculate determinants and be able to obtain the eigenvalues and eigenvectors of a matrix. -To solve systems over dimensioned by least squares.
- To be fluent in the most commonly used mathematical terminology in Geology.
- To transmit in written form the mathematical knowledge acquired.
- To know the application of the acquired knowledge to Geology
- To work as a team, constructively criticizing the opinions of others, sharing information and knowledge with colleagues to seek joint solutions.

3. Syllabus

- Trigonometric formulas.
- Elementary Real Functions. -Graphics
- Function limits -Continuity. -Bisection method.
- Derivatives. Calculus and geometric and physical interpretation. Applications of derivatives: maxima and minima. Graphical representation of real functions. Newton's method. Polynomial interpolation.
- Indefinite integrals. Change of variable, integration by parts, rational and trigonometric integrals. - Definite integral. Barrow's rule. Applications: Areas, volumes and lengths. Numerical integration.
- Matrices. Operations. Staggered matrices. Range. Determinants.
- Solving linear systems. Gauss method Optimization by Least Squares.

- Eigenvalues and eigenvectors. Powers of square matrices.
- Operations with vectors in Euclidean space.

4. Academic activities

- Participative lectures in large groups with problem posing and solving. (2 hours per week) ¹- Computer practice: Introduction to scientific programming and numerical problem solving.
- Tutorials (small groups and/or individualized).
- Teaching work in small groups.
- Assessment tests.

5. Assessment system

It is evaluated in continuous evaluation mode throughout the term by means of:

- A written partial exam corresponding to the first four-month period (40% of the final grade). The student has the option to repeat this exam in the May call of the subject.
- A written midterm exam corresponding to the second four-month period. (40% of the final grade).
- In order to pass the subject it is necessary to obtain at least 4 points out of 10 in each one of the exams and that the average grade is equal or higher than 5 points
- A practical exam corresponding to the practices of the whole year (20 % of the final grade).
- Participation in problem solving in class and group work will be valued with additional points.

However, there is the possibility of being evaluated globally in the official calls of May and June with a global test , which will allow the student to opt for 100% of the grade. The global test will have two parts and each of them will have a weight of 50% of the final grade. In order to pass the subject by means of the global test it will be necessary to obtain a minimum grade of 5 points out of 10.