Universitat Autònoma de Barcelona

2019/2020

Mathematics

Code: 103242
ECTS Credits: 6

Degree	Type	Year	Semester
2501925 Food Science and Technology	OB	1	1

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

The subject has no established prerequisites. In spite of this, it is convenient for the student to have a good knowledge of the simplest algebraic calculations (operations with fractions and roots, powers of a binomial, simplification of algebraic expressions, rules of logical inference). It will also be convenient for the student to review polynomials (operations, roots, and factorial decomposition).

Objectives and Contextualisation

The objective of this subject is that the student acquires the knowledge and the basic mathematical tools to be able to understand, use and develop the mathematical models associated with the chemical, physical or biological phenomena. The ability of the student to express himself in mathematical language must help him to approach scientific texts, work with computer software and raise and solve problems. A first transversal objective to be achieved is the development of scientific rigor, logical thinking and the critical spirit.

Competences

- Analyse, summarise, resolve problems and make professional decisions.
- Apply knowledge of the basic sciences to food science and technology.
- Apply the scientific method to resolving problems.
- Search for, manage and interpret information from different sources.
- Use IT resources for communication, the search for information within the field of study, data processing and calculations.

Learning Outcomes

1. Analyse, summarise, resolve problems and make professional decisions.
2. Apply the scientific method to resolving problems.
3. Compare analytical methods with numerical methods: the advantages and disadvantages of each.
4. Master the language and the basic tools of calculus (one or several variables).
5. Master the language and the basic tools of linear algebra.
6. Recognise the advantages and disadvantages of symbolic calculus tools.
7. Recognise the usefulness of mathematical methods in calculus, algebra and numbers, for modelling simple, real situations.

8. Search for, manage and interpret information from different sources.
9. Use IT resources for communication, the search for information within the field of study, data processing and calculations.
10. Use numerical methods to solve problems in algebra and calculus.
11. Use symbolic calculus by implementing processes to solve specific problems in algebra, calculus or numbers.

Content

1. Algebra

1.1 Sets of numbers. Sum and product operations, signs rule. Inequalities and absolute value. Real roots and power operations. (1 hr)

1.2 Polynomials. Roots and decomposition of polynomials. (1 hr)

2. Differential calculus of one variable

2.1 Concept of function. Examples of functions of real variable (polynomial, rational) (1 h.)

2.2 Limits of functions. Continuous functions (1 hr)

2.3 The derivative. Geometric interpretation and dynamic interpretation. Rule of the chain. (2.5 h.)

2.4 Inverse function. Exponential and logarithmic functions. (2.5 h.)

2.5 Growth and decrease of a function. Relative extremes. Graphical representation of functions (2 h.)

2.6 Optimization. (2.5 h.)

3. Integral calculus

3.1 Definite integral. The fundamental theorem of integral. (1.5 hr)

3.2 Calculation of some primitives. (2.5 h.)

4. Differential equations

4.1 Differential equations. Initial value problem. (1.5 hr)

4.2 Separable equations and linear equations. Applications to the balance of matter and the growth of populations (5 h.)

Methodology

The face-to-face teaching is distributed in:

Theory:

These are classes in which the teacher introduces the basic concepts corresponding to subject matter, showing examples of their application, taking into account the attendees and adapting to their level. The student will complement the teacher's explanations with the autonomous personal study.

Problems:
The classes of problems are done in small groups and in them both the understanding of the concepts introduced and the techniques of problem solving are worked on.

Practices with a computer:
The student learns to use a symbolic and numerical mathematical software. The practical classes are carried out in computer rooms in small groups. Problem solving works with the help of computer support.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practices in the computer room	8	0.32	3, 6, 7, 11, 10
Problems classes	20	0.8	1, 2, 5, 4, 7
Theory	24	0.96	5, 4
Type: Supervised			
Tutorials	6	0.24	1, 8, 5
Type: Autonomous			
Problems resolution	42	1.68	1, 2, 5, 4, 7
Study	40	1.6	5, 4

Assessment

The evaluation of the subject will be done in accordance with the following criteria:

Exercises of the practices in the computer lab: 10%
Two partial exams: 45% each
Recovery exam, only in case it is necessary: 90%

If in some of the partial exams a note is less than 3.5, the presence in the recovery test will be compulsory.

It will be considered that a student is not evaluable if he has participated in activities
of evaluation that represent $\leq$ 15% of the final grade.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of practices	10	2	0.08	1, 2, 8, 3, 5, 4, 6, 7, 11, 9, 10
First control	45	2	0.08	5, 4
Global examination	90	4	0.16	2, 5, 4
Second control	45	2	0.08	5, 4

Bibliography

Batschelet, E., Matemáticas básicas para biocientíficos, Dossat, Madrid

Neuhauser, C., Matemáticas para ciencias, Prentice Hall

Newby, J.C., Mathematics for the Biological Sciences, Clarendon Press

Salas, S. I Hille, E. Calculus, Volum 1. Editorial Reverté