Universitat Autònoma de Barcelona

2019/2020

Mathematics

Code: 101001
ECTS Credits: 6

Degree	Type	Year	Semester
2500502 Microbiology	FB	1	2

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

We do not need any prerequisites for this subject, but we recommend to follow the propedèutic course in mathematics, if the student does not have a good level in mathematics.

Objectives and Contextualisation

In the context of microbiology studies, a solid mathematical training is essential, especially to be able to understand and use the function graphs, the differential calculus and the understanding of the models of growth, as well as basic statistical inference tools. Like in any university degree, It is essential that students reach a critical reasoning and respect for diversity and plurality of ideas, people and situations. In order to include a gender perspective in the subject, we include written bibliography for women and we will make special mention of scientific contributions from women related to the agenda of the subject, as well as we will include more women as protagonists of the statements of the problems that consider timely. Obviously, and something we already do, we will use non-sexist and androcentric language in all Written and visual or other documents of the subject.

The specific objectives of the subject are:

1. Understanding of the basic tools to draw and interpret graphs of functions.

2. Study of the growth of biological populations. The exponential growth and the logistic growth. use and interpretation of logarithmic graphs.

3. Acquisition of notions about interpretation of data, application of tests of hypothesis contrasts and calculation of confidence intervals. Use of computer tools for the statistical treatment of data.

Competences

- Apply knowledge of theory to practice
- Communicate orally and in writing.
- Design experiments and interpret the results
- Know, interpret and use basic tools of mathematical calculus and statistics.

Learning Outcomes

1. Apply knowledge of theory to practice
2. Communicate orally and in writing.
3. Design experiments and interpret the results
4. Know, interpret and use basic tools of mathematical calculus and statistics.

Content

Program

1. Graphic representation and functions of one variable. Dependence of parameters. Polynomial functions and rational functions

2. The most important transcendental functions. The exponential function. The logarithmic function. Experimentation. Dimensional analysis. Logarithmic graphs

3. Growth and exponential decrease. Logistic growth The derivative as a growth rate and the differential equations as mathematical models of the change of magnitudes.

4. Introduction to probability. Random variables and more frequent distributions.

5. Descriptive statistics. Descriptive study of a variable: mean, deviation, bar diagrams. samples statistical

6. Introduction to statistical inference. Confidence intervals and hypothesis tests.

Methodology

The subject consists of three main activities, plus complementary ones. There will be theory classes called "magistrals", which will only be "magistrals" in the form. From the point of view of the content it is very difficult to distinguish between theory and problems and in fact the theory classes will be full of examples and exercises, and its theoretical part will be very limited. There will also be problem sessions, complementary to theory classes and where exercises will be solved without introducing new concepts. Finally sessions of two hours of practices will be held in the computer room, where specific software will be used for the mathematical calculation (Maple / Sage) and possibly another more generic one (Excel) that will also be used for the Statistical practices. These activities will be tutorials in which doubts that have not been solved yet, will be clarified in the class. The communication with the professors will preferably be face-to-face, although they can also be answer specific questions by email or through the Virtual Campus.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Computer practice	8	0.32	1, 4, 3, 2
Problem sessions	14	0.56	1, 4, 2
Theory sessions	30	1.2	1, 4
Type: Supervised			
Doubt clearing sessions student-professor	4	0.16	1, 4, 2
Type: Autonomous			

At home work	40	1.6	1, 4
Problem solving	37	1.48	1, 4, 3
Writing mathematics	12	0.48	1, 4, 3, 2

Assessment

The competences of this subject will be evaluated by means of continuous evaluation,

which will include written exams, practices and exercise deliveries.

The evaluation system is organized in the following blocks, each of which will be assigned a specific weight in the final qualification:

Practical block:

this module will evaluate the performance of the practices and the presentation of memories and / or exercises related to them.

This module will have a global weight of 20% (2 points of the final grade).

Deliveries:

In this block the student will have to solve problems.

It will have a 10% weight on the final mark (1 point of the final grade).

Partial exams, Second-chance exams / Improvement:

This module will consist of two partial tests at the end of the two parts in which the subject is divided (Themes 1, 2 and 3 and Themes 4, 5 and 6).

The first partial test will have a weight of 30% on the final grade.

The second one will have a weight of 40% on the final mark.

There will also be a second-chance / improvement exam.

To participate in it, students must have been previously evaluated in a set of activities whose weight equals to a minimum of two thirds of the total grade of the subject or module.

Therefore, the students will obtain the qualification of "Non-evaluable" when the evaluation activities carried out have a weighting of less than 67% in the final grade ". The final grade of the subject will be obtained as follows.

Let P be the note from the practice block, E the note of deliveries, P1 the note of the first partial, P2 the note of the second partial and R the note of the second-chance/ improvement exam.

We will get the note following the formula:

FINAL NOTE ASSIGNATURA = 0.2 * P + 0.1E + MAX (0.3 * P1 + 0.4 * P2.0.7 * R),

provided that in each of the partial tests a rating of 3.5 or higher has been obtained.

It will be considered that a student obtains the qualification of Non-evaluable if the number of evaluation activities performed is less than two thirds of those programmed for the subject.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
First partial exam	30%	2	0.08	1, 4, 2
Problem deliveries	10%	0	0	1, 4, 2
Second partial exam	40%	3	0.12	1, 4, 2
computer exercises	20%	0	0	1, 4, 3, 2

Bibliography

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

Bardina, X., Farré, M., Estadística : un curs introductori per a estudiants de ciències socials i humanes Colecció Materials, Universitat Autònoma de Barcelona

Delgado de la Torre, R. Apuntes de probabilidad y estadística. Colecció Materials, Universitat Autònoma de Barcelona

Neuhauser, C. Matemáticas para ciencias, Prentice Hall Newby,

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