Academic Year/course: 2021/22

27101 - Mathematics

Syllabus Information

Academic Year: 2021/22
Subject: 27101 - Matemáticas
Faculty / School: 100 - Facultad de Ciencias
Degree: 446 - Degree in Biotechnology
ECTS: 9.0
Year: 1
Semester: Annual
Subject Type: Basic Education
Module:

1. General information

1.1. Aims of the course

This is a basic course for Biotechnology students, where they will learn the mathematics they will need in other courses.

1.2. Context and importance of this course in the degree

Mathematics lies behind many of the courses of Biotechnology, and it is the basic language to do Science.

1.3. Recommendations to take this course

- Attend regularly the classes and the activities.
- Work on a continuous basis.
- Use the office hours of your teachers to ask questions.

2. Learning goals

2.1. Competences

- Learn the basic mathematical and computer skills needed in Biotechnology.
- Be able to reason when confronted with new problems.
- Be able to decide which tools should be used.

2.2. Learning goals

Basic mathematical skills.

2.3. Importance of learning goals

"Mathematics is a language plus reasoning; it is like a language plus logic. Mathematics is a tool for reasoning."

 Richard Feynman, **The Character of Physical Law**

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

- Some tests or quizzes throughout the year will amount for a 10% of the final grade.

- Attending the computer lab sessions and completing an exam about them will also amount for a 10% of the final grade.

- There will be two exams covering both the theoretical aspects and exercises (80% of the final grade). In order to pass the course it is compulsory to pass (a mark of 5 or higher, over 10) each one of these exams.

Should the sanitary conditions prevent from face-to-face classes or exams, classes and computer lab sessions will be delivered online.

In extreme circumstances computer lab sessions could be transformed into online tutoring in small groups. If this is the case, the mark of the two exams mentioned above will amount for 90% of the final grade, unless otherwise stated.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions, autonomous work, study and assessment tasks.

Students are expected to participate actively in class throughout the semester.

Further information regarding the course will be provided on the first day of class.

4.2. Learning tasks

The course includes the following learning tasks:

- Lectures.
- Practice sessions. Computer lab in small groups.
- Autonomous work and study.
- Assessment tasks.
- Blended learning through the Moodle page of the course; moodle.unizar.es (access restricted to students enrolled in the subject).

The teaching and assessment activities will be carried out in person unless, due to the health

provisions issued by the competent authorities and by the University of Zaragoza force them to

online.

4.3. Syllabus

The course will address the following topics:

1. **Sets of numbers.** Integer, rational, real and complex numbers. Basic combinatorics
2. **Differentiation in one variable.** Limits, continuity and derivatives. Optimization.
3. **Linear and polynomial approximation.** Tangent line. Mean-value Theorem. Taylor polynomials. Interpolation.
4. **Integration in one variable.** Change of variable, integration by parts, integral of rational functions. Euler and trigonometric changes. Applications of the integral calculus.
5. **Curves in parametrics coordinates.** Tangent line, area closed by a curve and curve length.
6. **Linear Algebra.** Matrices and linear transformactions. Eigenvalues and eigenvectors. Leslie models.
7. **Ordinary differential equations and linear systems.** Approximation of solutions. Separation of variables. Linear equations. Systems of linear equations.
8. **Differentiation in several variables.** Directional derivatives. Tangent planes. Basic optimization.
9. **Integration in several variables.** Vector fields and potential. Double and triple integrals. Applications: volumes.

4.4. Course planning and calendar

Schedules of lectures and problems will coincide with the officially established and will be available at: https://ciencias.unizar.es/grado-en-biotecnologia.

The places, calendar and groups for training and practical sessions will be established in coordination with the other courses at the beginning of the year. The Coordinator will form the groups of students for these activities at the beginning of the year to avoid overlaps with other courses.

For students enrolled in the course, places, times and dates of lectures and practical sessions will be public via Bulletin Board advertisements of the grade on the platform Moodle at the University of Zaragoza, https://moodle2.unizar.es/add/, and in the moodle page for the course. These routes will be also used to communicate enrolled students their distribution by groups of practical sessions, which will be organized by the coordination of degree. Provisional dates will be available on the

website of the Faculty of Sciences in the corresponding section of the Degree in Biotechnology: https://ciencias.unizar.es/grado-en-biotecnologia.

In this web the dates of exams will be available too.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27101