27101 - Mathematics

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	446 - Degree in Biotechnology
ECTS	9.0
Course	1
Period	Annual
Subject Type	Basic Education
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

For students enrolled in the subject, 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 there will be also available the dates of exams.

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

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5.1.General methodological presentation

The learning process is based in the following items:

- Theoretical Lectures,
- Problem sessions,
- Computer lab with free software

5.2.Learning activities

Theoretical Lectures.
Participative problem sessions.
Computer lab in small groups.

Semipresential learning through the Moodle page of the subject; moodle.unizar.es (acces restricted to students enrolled in the subject).

5.3.Program

1. **Sets of numbers.** Integer, rational, real and complex numbers. Basic combinatorics.
2. **Linear Algebra.** Matrices and linear transformactions. Eigenvalues and eigenvectors. Leslie models.
3. **Differentiation in one variable.** Limits, continuity and derivativity. Optimization.
4. **Linear and polynomic approximation.** Tangent line. Mean-value Theorem. Taylor polynomials.
5. **Integration in one variable.** Change of variable, integration by parts, integral of rational functions. Euler and trigonometric changes. Applications of the integral calculus.
6. **Curves in parametrics coordinates.** Tangent line, area closed by a curve and curve length.
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.

5.4.Planning and scheduling

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 rest of maters at beginning of course. The Coordinator will produce the groups of students for these activities at beginning of course to avoid overlaps with other subjects

5.5.Bibliography and recomended resources

- Abellanas Rapun, Lorenzo. Teoría y problemas de métodos de cálculo / Lorenzo Abellanas Rapún, Alberto Galindo Tixaire . - [1a ed.] Madrid [etc] : McGraw-Hill, 1989
- Apostol, Tom M.. Calculus. vol.1, Cálculo con funciones de una variable, con una introducción al álgebra lineal / Tom M. Apostol . - 2a ed. [reimp.] Barcelona, [etc.] : Reverté, D.L.1991
- Apostol, Tom M.. Calculus. Vol.2, Cálculo con funciones de varias variables y álgebra lineal, con aplicaciones a las ecuaciones diferenciales y a las probabilidades / Tom M. Apostol. - 2ª ed., 7ª reimp. Barcelona, [etc.] : Reverté, D.L. 2002
- Ayres, Frank. Teoría y problemas de matrices / Frank Ayres, Jr. México, D.F. [etc.] : McGraw-Hill, 1983
- Ayres, Frank. Cálculo / Frank Ayres, Elliot Mendelson ; traducción, Yelka María García . - 4ª ed. Bogotá [etc.] : McGraw-Hill, imp. 2000
- Meyer, Carl Dean. Matrix analysis and applied linear algebra / Carl Meyer Philadelphia : Society for Industrial and Applied Mathematics, cop. 2000
- Neuhauser, Claudia. Matemáticas para ciencias / Claudia Neuhauser ; traducción, Ana Torres Suárez . - 2ª ed., reimp. Madrid [etc.] : Pearson Prentice Hall, D.L. 2009
- Stewart, James. Cálculo : conceptos y contextos / James Stewart ; [traducción, Joaquín Ramos Santalla] . - 3ª ed.

México [etc.] : International Thomson Editores, cop. 2006

- Zill, Dennis G.. Ecuaciones diferenciales con aplicaciones de modelado / Dennis G. Zill . - 8ª ed. México [etc.] : Thomson, cop. 2007