COURSE DATA

DATA SUBJECT

Code: 33160
Name: Mathematics I
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1111 - Grado en Biotecnología	Facultat de Ciències Biològiques	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1111 - Grado en Biotecnología	Mathematics	BASIC

COORDINATION

MARTINEZ CAMPOS CEDRIC

SUMMARY

The course Mathematics I forms part of scientific literacy that students of Biotecnology must acquire before entering fully into the specifics of the degree.

As a first goal, the subject must fill in the gaps in mathematical knowledge of many students who enter university without studying mathematics at second course of high school. Corresponding to this aspect, the course begins with an introduction in which issues such as operations with numbers and vector elementary functions (including trigonometric and drawing to do a review of trigonometry), graphs of functions and their interpretation are remembered. As another goal, the subject should take the basic math skills for any experimental science: a) the differential and integral calculus needed to see how math involved in issues related to speed, slope, determining maximum and minimum measurement areas...; b) an introduction to differential equations, with more emphasis in its concept and meaning of the solutions than in the methods of solution, on one side because it is more interesting for a user which is not going to be a professional mathematician, on the other side, because time does not permit to go far away; c) an introduction to the methods of numerical calculations, since most of the mathematical problems that they will find have no exact solution and we must go to use these methods, with the help of software for them.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

1102 -

Dominar bien los cálculos numéricos y el análisis de errores.

Emplear correctamente herramientas informáticas de cálculo, análisis y representación de datos (hojas de cálculo).

Emplear correctamente y con soltura la calculadora científica y otras herramientas de cálculo.

Saber expresarse correctamente en términos matemáticos, estadísticos, químicos, físicos y biológicos.

1111 - Grado en Biotecnología

Actuar con autonomía en el aprendizaje, tomando decisiones fundamentadas en diferentes contextos, emitiendo juicios en base a la experimentación y el análisis y transfiriendo el conocimiento a nuevas situaciones

Apply analytical, synthetic and critical thinking skills in the application of the scientific method.

Colaborar eficazmente en equipos de trabajo, asumiendo responsabilidades y funciones de liderazgo y contribuyendo a la mejora y desarrollo colectivo

Demostrar razonamiento crítico y autocrítico en el ámbito de la titulación, considerando aspectos tales como la ética profesional, los valores morales y las implicaciones sociales de las diferentes actividades realizadas

Design prospective market research for a biotechnological product.

Participate in multidisciplinary teams, engaging in teamwork and collaboration.

Que el estudiantado demuestre su capacidad para calcular correctamente los parámetros relevantes de un proceso o un experimento mediante la representación de los datos experimentales

Que el estudiantado demuestre su capacidad para utilizar herramientas matemáticas y estadísticas para la resolución de problemas biológicos

Saber comunicarse de manera efectiva, tanto de forma oral como escrita, adaptándose a las características de la situación y de la audiencia

Solve differential and integral equations.

Use English to write reports and to interpret information from protocols, manuals and databases.

Use mathematical language and identify and solve mathematical problems in biology.

DESCRIPTION OF CONTENTS

1. Part 1: Introduction

Cap. 1. The plane R ^ 2 and the space R ^ 3.
Vectors. Equation of a line in the plane. Slope of a line. Distance in the plane and in the space.
Cap. 2. Functions.
Graph of a function. Inverse of a function. Review of elementary functions. Exponential growth, logarithmic and polynomial. Equations. Graphical solution of equations. Limits of sequences and functions. Continuous functions and their graphs.

2. Part 2: Differential and Integral Calculus

Cap. 3. The derivative.
3.1 The derivative of a variable as a function of speed.
3.2 Calculation of derivatives. The chain rule.
3.3 The derivative of a function as the slope of its graph.
3.4 Numerical methods of solving equations based on the use of the derivative.

Cap. 4. Optimization.
4.1 Points critical functions of a variable.
4.2 Maximum and minimum.
4.3 Maximum and minimum relative.
4.4 Concavity and convexity.
4.5 Interpreting and drawing graphs.

Cap. 5. The integral for functions of one variable.
5.1 Primitives or antiderivatives.
5.2 The primitive as solutions of differential equations.
5.3 Some methods of integration.

Cap. 6. The Definite Integral.
6.1 Definition of definite integral.
6.2 Relationship with the primitive. Barrow Rule.
6.3 Applications of integral calculus to the calculation of areas.
6.4 Methods for numerical integration.

3. Part 3: Differential Equations

Cap. 7. Ordinary differential equations of first order.
7.1 Background. Unit constant. Initial conditions.
7.2 Differential equations of first order. Graphical view in the plane.
7.3 Explicit solutions of some equations simpler first order.
7.4 Numerical solutions of differential equations of first order.

Cap. 8. Some differential equations in biology and environment.
8.1 Equilibrium and stability.
8.2 Crecimiento an exponential population. Restricted growth. Logistic equation.
8.3 Allometric growth.
8.4 Homeostasis.
8.5 Dynamic balance of matter or energy and matter.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	3,00
Theory	31,00
Computer classroom practice	26,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	22,00
Independent study and work	0,00
Preparation of lessons	52,00
Preparation for assessment activities	16,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

The course will be developed in:

- Theoretical classes with attendance not mandatory.

- Practical classes of problem-solving face and learning of concepts using a computer program in the

computer room, with compulsory attendance. Idea is to encourage initiative and creativity of the student looking for that, to many problems, first look how to resolve it or get an idea of what can happen with the help of computer.

- Active participation in tutorials regulated.

EVALUATION

The evaluation will be conducted by:

- Objective test, consisting of a test with both theoretical and practical questions. The rate at which this test will influence the final grade will be 80%. To perform this weighted average will be necessary to obtain a minimum score of 4 out of 10 in this test.

- Attendance at tutorials and practical activities is compulsory and a prerequisite to pass the course. (80% attendance minimum).

- It is required the submission of all proposed works to each student (these may consist of handing-in individual or group work, on-site resolution of exercises/controls or completion of theoretical-practical questionnaires in the virtual classroom). The rate at which the score of this work will influence the final grade will be 20%. To get the weighted average with the objective test will be required to have obtained a minimum score of 4 out of 10 in these works.

REFERENCES

- J. Stewart: Cálculo : conceptos y contextos, Tercera Edición, Cengeage Learning Ed. 2006
- Claudia Neuhauser: "Matemáticas para Ciencias", Ed. Pearson/Prentice Hall, Segunda edición, 2009
- R.Larson, B.H. Edwards: Calculo 1. Mc Graw Hill 2010.
- D.G. Zill, W.S. Wright: Cálculo de una variable. Mc Graw Hill 2011.
- James Callahan, Kenneth Hoffman, David Cox, Donal OShea, Harriet Pollatsek, Lester Senechal : Calculus in Context . The Five College Calculus Project. http://math.smith.edu/Local/cicintro/cicintro.html
- S. L. Salas, E. Hille."Calculus I y II", 1994, I Reverté, Barcelona
- S. T. Tan: Applied Calculus for the Managerial, Life, and Social Sciences, 5th Edition, Thomson Learning, Belmont 2002
- G.B. Thomas, R.L. Finney. "Cálculo con Geometría Analítica", 1987, Addison-Wesley Iberoamericana, Wilmington