Universidad Europea

1. OVERVIEW

Subject Area	Mathematics
Degree	Bachelor's Degree in Biotechnology
School/Faculty	School of Biomedical and Health Sciences
Year	First
ECTS	6
Type	Core
Language(s)	Spanish
Delivery Mode	On campus
Semester	First
Academic Year	2024/2025
Coordinating professor	Raquel Gómez Medina
Teacher	Héctor García Cabrera

2. INTRODUCTION

Mathematics provides the basic knowledge and tools necessary for learning in most of the subjects that make up the Degree course. It develops approaches which are important in maths, such as critical thinking, verification techniques, evaluating accuracy and questioning intuition.
The subject develops along the two main branches:

1. Calculus which studies the behaviour of multivariable functions and continues to be, since the times of Newton and Leibniz, the most suitable mathematical tool for enhancing skills and abilities in approaching and solving such problems. Calculus is used to verify scientific theory on matters such as kinetics and dynamics of a mobile object, the propagation of electromagnetic fields, fluid mechanics, engineering problems and much more. Students will be able to understand the concepts, procedures and strategies of infinitesimal, differential and integral calculus in one or several variables for subsequent application in practical exercises and problems.

2. Linear and matrix algebra and analytical geometry offers the theoretical and practical concepts necessary to resolve problems using algebraic matrices and transformations. It also encourages reasoning and the application of mathematical methods in all stages of student learning.

As a result, we have specifically selected a series of core concept areas: Calculus and Linear Algebra, Differential Calculus, Integral Calculus and Analytical Geometry. These are all of great use in chemical, physical, biological and technological systems in the field of biotechnology.
Students will learn the theory in each unit and have access to activities and exercises so they can put concepts learned into practice and improve their ability to apply mathematical methods to all areas of their professional development.

3. LEARNING OUTCOMES (RA, by the acronym in Spanish)

ABILITIES (HAB, by the acronym in Spanish)

- **HAB03**. Resolve problems and interpret mathematical, statistical, biophysical and thermodynamic data applying suitable equations or procedures for the study of systems of interest in biotechnology.
    - Resolve and interpret cases and problems which arise in their context. 2.- Know how to evaluate scientific data using mathematical and statistical procedures. 3.- Achieve oral and written mastery of the language used in mathematics.
    - Demonstrate computer and word processing skills for handling physical, chemical and biological data and information.

SKILLS

- **COMP18**. Identify and apply mathematical methods and tools to the field of biotechnology.

4. CONTENTS

- Linear algebra and analytical geometry.
- Real functions of a single or several variables. The most important properties of polynomial, exponential, logarithmic and trigonometric functions.
- Differential calculus. Concept of derivatives and their applications.
- Theory of integrals and differential equations. First-order differential equation models and linear n-th order differential equations.

This subject area is divided into five learning units, which are then divided into various topics:

- **Unit 1. Operations with real numbers:**
  This unit deals with different operations with real numbers learning about the main tools students will need for any mathematical calculation.

- **Unit 2. Functions of a real variable:**
  This unit defines and classifies the different types of functions of a single variable to later conclude with a general look at functions of several variables.

- **Unit 3. Differential calculus:**
  This unit teaches students the different derivative rules for functions of one or several variables as well as their application in differential calculus.

- **Unit 4. Integral calculus:**
  This unit introduces the concept of integrals and later shows the different methods of calculus, both for indefinite and definite integrals.

- **Unit 5. Differential equations:**
  This unit describes the basic concepts associated with ordinary differential equations as well as basic techniques for solving them.

The organisation of content is subject to change because of logistical reasons. Students will be informed of any changes in due time and course.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Master lecture
- Collaborative learning
- Problem-based learning

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On campus:

Learning activity	Number of hours
Lectures	40
Report writing	4
Assessment	6
Practical work (problems, tasks, projects, workshops and/or laboratory work)	30
Tutorials	20
Independent working	50
TOTAL	**150**

7. ASSESSMENT

The assessment methods, together with how much they each count towards the final grade for the subject area, are as follows:

On campus:

Assessment system	Weighting
On-campus assessment tests (SE1)	60%
Essays and reports (SE2)	15%
Case / Problem (SE3)	25%

On the Virtual Campus, when you open the subject area, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

7.1. Ordinary exam period

To pass the subject area in the ordinary exam period you must obtain a mark of 5.0 or more out of 10.0 in all assessed parts of the subject. Any part you do not pass in the ordinary exam period will need to be recovered in the extraordinary exam period (resits).

Your final grade will be the average of the partial marks in each of the learning activities you have passed.

The continuous assessment system for the learning activities requires attendance to at least 50% of the classes.

It is compulsory for students to accredit attendance to at least 50% of classes. This requirement is essential to the assessment process and qualifies students for the right to obtain academic counselling, support and monitoring from the professor. To this end, students must use the technological means made available by the University to accredit their daily attendance to each of their classes. This system will also serve to guarantee an objective record of the active role of the students in the classroom. Failure to accredit attendance to at least 50% of the classes by any of the means proposed by the University will mean that the professor awarding a fail to the student for that subject area in the ordinary exam period in accordance with the grading system outlined in these regulations. All of the above, without prejudice to the other requirements or higher attendance percentages that other faculties may stipulate in their learning guides or internal regulations. Regulations for the assessment of official degree programmes, Art. 1 point 4.

(https://universidadeuropea.com/resources/media/documents/Reglamento_de_evaluacion_de_titulaciones_oficiales_grado-_UEM._Eng-en-US.pdf)

7.2. Extraordinary exam period (resits)

To pass the subject area in the extraordinary exam period (resits), the students must obtain a mark equal to or above 5.0 out of 10.0 in all parts of the subject assessment they did not pass during the ordinary exam period.

The student must submit the activities not passed in the ordinary exam period taking into account the corrections or comments made by the teacher. The student must also submit any activities which were not submitted.

The final grade will be the average of the partial marks in each of the activities passed (with a mark equal to or higher than 5 out of 10). The marks for the assessable activities the student passed in the ordinary exam period will be maintained for calculating this grade.

8. TIMELINE

The timeline with delivery dates of assessable activities in the subject area is indicated in this section:

Assessable activities	Date
Partial on-campus assessment test	Week 6
Final assessment test	Week 17
Activities UA1. Theoretical and/or practical problem-solving.	End of Unit 1
Activities UA2. Theoretical and/or practical problem-solving.	End of Unit 2
Activities UA3. Theoretical and/or practical problem-solving.	End of Unit 3
Activities UA4. Theoretical and/or practical problem-solving.	End of Unit 4
Activities UA5. Theoretical and/or practical problem-solving.	End of Unit 5

The timeline may be subject to modifications for logistical reasons. Students will be informed of any changes in due time and course.

9. BIBLIOGRAPHY

The main reference works for the academic year are:
- LARSON R., et al., Calculus of a single variable. Brooks Cole, 2009.
- STEWART J., Cálculo de una variable: trascendentes tempranas. Cengage Learning, 2008 (6ª edición).
- STEWART J., Cálculo multivariable. International Thomson, 1999 (3ª edición).
- AYRES F. and MENDELSON E., Schaum's Outline of Calculus. McGraw-Hill, 2012 (7th Edition).
- LAY D. C., Linear Algebra and its Applications. Addison Wesley, 2006.
- STRANG G., Linear Algebra and its Applications. Cengage Learning, 2005 (4th Edition).

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

The Educational Guidance and Diversity Unit (ODI in Spanish) offers support throughout your time at university to help you with your academic achievement. Other cornerstones of our educational policy are the inclusion of students with special educational needs, universal access in all our university campuses and equal opportunities.

This ODI unit offers students:

1. Support and monitoring through counselling and personalised student plans for those who need to improve their academic performance.
2. Curricular adaptations to uphold diversity, with assistance for those students who require specific educational support, leading to equal opportunities without significant changes to methodology or evaluation.

3. We offer students a range of extracurricular educational resources to reinforce skills which will enhance their personal and professional development.
4. Career guidance by offering tools and advice to students with doubts regarding their professional careers or those who believe they have chosen the wrong line of study.

Students who need educational support can contact us at:
orientacioneducativa@universidadeuropea.es

11. SATISFACTION SURVEYS

Your opinion matters!

Universidad Europea encourages you to complete our satisfaction surveys to identify strengths and areas for improvement for staff, degree courses and the learning process.

These surveys will be available in the surveys area of your virtual campus or by email.

Your opinion is essential to improve the quality of the degree.

Many thanks for taking part.