1. BASIC INFORMATION

Course	Mathematical Analysis
Degree Program	BSc degrees in Computer Science
School	Escuela Politécnica
Year	2025-2026
Credits (ECTS)	6
Credit type	Basic
Language(s)	English / Spanish
Delivery mode	On campus
Semester	S1
Academic year	2025-2026
Coordinating professor	María José Terrón López

2. PRESENTATION

Mathematical Analysis/Calculus is the branch of Mathematics concerned with variation and motion. Wherever motion or growth occurs, Calculus has remained, since the time of Newton and Leibniz, the appropriate mathematical tool to provide the skills and abilities needed to formulate and solve such problems. Calculus is used to verify scientific theories on topics such as liquid pressure, fluid motion, mechanical vibrations, engineering problems, and more.
The Mathematical Analysis course will enable students to acquire the skills and competencies necessary to perform effectively in subjects such as Fundamentals of Physics for Engineering, Statistics and Optimization, and in almost all degree courses where students will need to apply their acquired knowledge of Calculus.

Students must be able to understand the concepts, procedures, and strategies of infinitesimal, differential, and integral Calculus, both in one and several variables, for their subsequent application in exercises and practical problems.

This subject belongs to the area of knowledge of Mathematics and Statistics, which comprises the following subjects:
• Mathematical Analysis – 6 ECTS (1st year)
• Algebra – 6 ECTS (1st year)
• Discrete Mathematics and Logic – 6 ECTS (1st year)
• Statistics – 6 ECTS (2nd year)

3. LEARNING OUTCOMES

Skills:

SK02. Solve mathematical problems that may arise in engineering by applying knowledge of linear algebra, differential and integral calculus, numerical methods, numerical algorithms, statistics, and optimization

Competences:

CP03. To use information and communication technology to search for and analyze data, as well as to research, communicate and learn

4. CONTENTS

The Contents of the course/module are listed below:

- Real and complex numbers
- Real functions of a real variable
- Sequences and series of real numbers
- Real functions of several variables
- Introduction to ordinary differential equations
- Numerical methods.
- Optimization

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Lectures/ web conferencing
- Problem-based learning

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours
Lectures	12
Practical seminars	18
Problem-solving	32
Workshops and/or laboratory work	10
Independent working	56
Lectures	12
Debates and discussions	8
Tutorials	12
On campus knowledge assessment tests	2
TOTAL	**150**

7. ASSESSMENT

Each assessable learning activity represents an opportunity for the student to make progress, receive feedback, and consolidate knowledge, skills, and competences. The Learning Outcomes outlined in this guide provide direction for this process and serve as benchmarks for their achievement.
Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment Systems	Weight (%)
On campus knowledge assessment tests	50-60%
Case/problem	20-40%
Workshops/lab work journal	10-20%

When you access the course on the Campus Virtual, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

In order to pass the course/module in the ordinary call, the student must obtain a grade greater than or equal to 5.0 (out of 10), in all the evaluation systems proposed in this guide. The final grade will be calculated from the weighted average of all the evaluation systems described.

If in any of the evaluation systems proposed in this guide, a grade lower than 5.0 (out of 10) is obtained, the final grade of the course/module will be "fail" even if, in the result of the weighted average, a value higher than 5.0 (out of 10) is obtained. In the latter case, the course/module would still be "failed" obtaining a final grade of 4.0 (out of 10).

Delivery of activities

Compliance with deadlines is essential to ensure the fairness and planning of the training process.

In case of not submitting an evaluable formative activity in due time and form, and without prior justification, it will not be evaluated and, therefore, will be recorded as "not submitted".

The student is encouraged to communicate with sufficient time in advance to the teacher of the course/module, any difficulty that may affect their participation in any activity.

Attendance

Active participation in the training sessions is a key component of learning. In order to pass the course/module, at least 50% attendance is required. If this minimum percentage is not reached, the teacher may consider the course/module as "failed", according to the evaluation regulations of the Universidad Europea de Andalucía.

7.2. Second exam period

The extraordinary exam offers a new opportunity for students to demonstrate their learning. To pass it, it will be necessary to obtain a final grade (weighted average) equal to or higher than 5.0 (out of 10.0).

Delivery of activities

The student must submit and pass those mandatory training activities not delivered or not passed in the ordinary call, respecting the new deadlines established. In case of failure to comply with these new deadlines, the activity will not be evaluated and, therefore, will be recorded as "not presented".

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Assessable activities	Date
Activity 1: Completion of various assignments, problems and application exercises, practical/lab reports, workshop reports, reports on visits, conferences and workshops attended, and collaborative work. Active participation (questions and problems proposed and discussed in class or in the course forum)	Weeks 2–15
Activity 2: Intermediate written test	Week 7
Activity 3: Final project/assignment for the course	Weeks 14–16
Activity 4: Final exam for the course	Weeks 16–17

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

9. REFERENCES

Recommended references are listed below:

- de Burgos, J. (2007). *Cálculo infinitesimal de una variable* (2ª ed.). McGraw-Hill Interamericana de España.
- de Burgos, J. (2008). *Cálculo infinitesimal de varias variables* (2ª ed.). McGraw-Hill Interamericana de España.
- Larson, R., Hostetler, R. P., & Edwards, B. H. (2009). *Calculus of a single variable* (8th ed.). Brooks Cole.
- Stewart, J. (2015). *Single Variable Calculus: Early Transcendentals* (8th ed.). Cengage Learning.
- Stewart, J. (2020). *Multivariable Calculus*. Brooks/Cole.
- AYRES F. and MENDELSON E., Ayres, F., Jr., & Mendelson, E. (2012). *Schaum's outline of calculus* (7th ed.). McGraw-Hill.

10. AREA OF GUIDANCE, DIVERSITY AND INCLUSION

The Area of Guidance, Diversity and Inclusion (ODI) offers support to students throughout their university career, with the aim of facilitating their academic and personal development and supporting them in

achieving their goals. This Area focuses its work on three Core pillars: the inclusion of students with specific educational support needs, the promotion of universal accessibility in the educational community and the guarantee of equal opportunities for all.

Among the services offered are:

- **Academic accompaniment and monitoring**, through counselling and the development of personalised plans aimed at those who need to improve their academic performance.
- **Attention to diversity**, through the implementation of non-significant curricular adjustments - in methodological and Assessment aspects - for students with specific educational support needs, in order to guarantee equal opportunities.
- **Extracurricular training resources**, aimed at developing personal and professional Competencies that contribute to the integral growth of students.
- **Vocational guidance**, through the provision of tools and advice to those who have concerns about their choice of Degree or are considering a change in their educational path.

Students in need of educational support can contact the Area via the following email address: orientacioneducativa@universidadeuropea.es

11. ONLINE SURVEYS

Participating in the Satisfaction Surveys is an enriching opportunity to contribute to the continuous improvement of the Degree as well as the institution. Thanks to them, it is possible to identify which aspects of academics, teaching staff and the teaching-learning process are working well and which can be further improved.

With the aim of encouraging active participation in the completion of surveys among students, various channels of dissemination have been set up. The surveys are available in the space provided on the Virtual Campus and are also sent by email to facilitate access.

The responses collected allow decisions to be made that have a direct impact on the quality of the learning experience and on the day-to-day life of the university community.