1. BASIC INFORMATION

Subject	Calculus I
Degree Program	Bachelor's Degree in Mechanical Engineering
School/Faculty	School of Architecture, Engineering, Science and Computing
Year	First Year
ECTS	6
Type	Basic Course
Language	English
Modality	On-campus
Semester	First Semester
Academic course	2025-2026
Coordinating Professor	David García

2. INTRODUCTION

Calculus I provides the mathematical tools needed to formulate and solve a wide range of engineering problems, such as fluid pressure, fluid dynamics, or mechanical vibrations. Students will learn the concepts, procedures, and strategies of differential and integral calculus (single and multivariable) and apply them to practical exercises. The course also lays the foundation for future subjects like Calculus II and Statistics for Engineering.

3. LEARNING OUTCOMES

Skills

HAB1: Ability to solve mathematical problems in engineering, including:

- Linear algebra, geometry, differential geometry.
- Differential/integral calculus, ODEs/PDEs.
- Numerical methods, algorithms, statistics, and optimization.

Subject-Specific Skills:

- Apply principles of single/multivariable calculus.
- Understand continuity, limits, derivatives, and integrals.

- Interpret precision levels in solutions (exact/approximate, analytical/numerical).
- Solve differential/integral calculus problems.
- Apply calculus techniques to geometric/physical problems.
- Optimize single/multivariable functions.

Competencies

CP14: Integrate analysis with critical thinking to evaluate professional ideas/options, using evidence-based decision-making.

4. COURSE CONTENT

The course consists of four core modules:

1. Real-valued functions of a real variable.
2. Differential calculus (single/multivariable).
3. Integral calculus (single/multivariable).
4. Optimization.

5. TEACHING-LEARNING METHODOLOGIES

The following outlines the teaching-learning methodologies to be applied:

- Lectures
- Problem-based learning

6. LEARNING ACTIVITIES

The table below outlines the learning activities, and the hours students are expected to dedicate to each:

On-campus:

Activity	Hours
Lectures	10
Practical seminars	20
Problem-solving sessions	50
Independent study	60
Debates/Discussion	5
On-campus Assessments	5
TOTAL	**150**

7. ASSESSMENT

The following lists the assessment systems and their respective weightings toward the final course grade:

On-campus:

Assessment method	Min. Weight (%)	Max. Weight (%)
On-campus exams	50	70
Case studies/problems	20	50
Performance evaluation	5	5

Detailed evaluation criteria and deadlines will be available on the Virtual Campus.

8. SCHEDULE

This section outlines the schedule with submission deadlines for assessable activities in the course:

Assessment Activities	Deadline (approx.)
Individual Problem Sets	Weekly
Midterm Exam	Mid-semester
Group Project	Throughout the semester
Final Exam	End of semester

Schedule subject to logistical changes; students will be notified.

9. BIBLIOGRAPHY

Recommended bibliography:

- LARSON, R., et al. *Calculus of a Single Variable*. Brooks Cole, 2009.
- STEWART, J. *Single Variable Calculus: Early Transcendentals*. Cengage, 2008.
- STEWART, J. *Multivariable Calculus*. Thomson, 1999 (3rd ed.).
- AYRES, F. & MENDELSON, E. *Schaum's Outline of Calculus*. McGraw-Hill, 2012 (7th ed.).

10. EDUCATIONAL SUPPORT UNIT

The Educational Support, Diversity, and Inclusion Unit (ODI) accompanies students throughout their university journey to help them achieve academic success. Our mission also focuses on:

- Inclusion of students with specific educational support needs.
- Universal accessibility across all university campuses.
- Equal opportunities for all.

Services offered by the ODI:

1. **Academic Support:** Personalized advising and tailored plans for students seeking to improve their academic performance.
2. **Diversity Accommodations:** Non-significant curriculum adjustments (e.g., adapted methodologies or assessments) for students with special needs, ensuring equity.
3. **Extracurricular Resources:** Training programs to develop personal and professional skills.
4. **Career Guidance:** Tools and counseling for students with vocational doubts or reconsidering their degree choice.

Contact:
Email: orientacioneducativa@universidadeuropea.es

11. SATISFACTION SURVEYS

Your opinion matters!

The European University encourages you to take part in satisfaction surveys to help identify strengths and areas for improvement regarding:

- Teaching staff
- Degree programs
- Teaching and learning processes

The surveys will be available:

- In the surveys section of your virtual campus
- Or via email invitation

Your feedback is essential to enhance the quality of our programs.
Thank you for your participation!