1. BASIC INFORMATION

Course	Calculus II
Degree program	Grado en Ing. Aeroespacial en Aeronaves (English)
School	Architecture, Engineering and Design
Year	First
ECTS	6 ECTS
Credit type	Basic
Language(s)	English
Delivery mode	On-site
Semester	Second
Academic year	2025/26
Coordinating professor	Dr. David García Nieto

2. PRESENTATION

This is a second-semester freshman mathematics course that builds upon foundational concepts and delves into advanced topics crucial for further studies in STEM fields. The course covers sequences and series, providing essential tools for understanding convergence and approximation. It then moves into the powerful concepts of line and flux integration, which are fundamental for applications in physics, engineering, and other quantitative disciplines. A significant portion of the course is dedicated to Riemann calculus, deepening the understanding of integration theory and its applications. Finally, the course provides an introduction to ordinary differential equations (ODEs), equipping students with methods to model and solve dynamic problems encountered in science and engineering. Its primary objectives are to help students develop a robust understanding of these advanced mathematical concepts, enhance their analytical and problem-solving skills, and provide them with an indispensable set of mathematical tools required in subsequent subjects of their degree program and in the modern workplace.

3. LEARNING OUTCOMES

Knowledge

KN19 (CON19). Identify the knowledge of basic subjects and technologies, enabling the student to learn new methods, theories and technologies, and endowed it with great versatility to adapt to new situations (autonomous learning).

Specific knowledge of the subject:

- Identify real functions of a real variable.
- Acquire knowledge of differential calculus for single and multiple variables.
- Acquire knowledge of integral calculus for single and multiple variables.

Skills

SK01 (HAB01). Ability to solve mathematical problems that may arise in engineering. Aptitude to apply knowledge of: linear algebra; geometry; differential geometry; differential and integral calculus; differential and partial differential equations; numerical methods; numerical algorithms; statistics, and optimization.

Specific skills of the subject:

- Solve problems in applied mathematics.
- Prepare structured and rigorous engineering reports (based on laboratory practices).
- Solve optimization problems.

Competences

CP12. Generate new ideas and concepts from known ideas and concepts, reaching conclusions or solving problems, challenges, and situations in an original way in the academic and professional environment.
CP16. Collaborate with others in achieving a shared academic or professional objective, actively participating, demonstrating empathy, and practicing active listening and respect for all team members.
CP17. Integrate analysis with critical thinking in an evaluation process of different ideas or professional possibilities and their potential for error, relying on evidence and objective data that lead to effective and valid decision-making.

4. CONTENT

- Sequences and Series
- Flux and line integration: Green, Gauss and Stokes
- Complex variable
- Riemann Line integration in the Complex plane
- Introduction to Ordinary Differential Equations

5. TEACHING-LEARNING METHODOLOGIES

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

- Cooperative learning
- Problem Based Learning (PBL)
- Learning assignments
- Master classes

6. LEARNING ACTIVITIES

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

Learning activity	Number of hours	Use of AI
TEA1: Resolution of applied exercises	25	Not permitted
TEA2: Master classes	25	Not permitted
TEA3: Academic supporting sessions	12.5	Permitted
TEA4: Preparation of projects (PBL methodology)	25	Suggested
TEA5: Search for information and preparation of written works and reports	12.5	Suggested
TEA6: Self-studying	50	Suggested
TOTAL	**150**	

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight
Exams, quizzes, and other tests of knowledge	30-35%
Preparation of articles, assessments, or reports	15-30%
Alternative evaluation techniques	15-30%
Field experiences, conferences, and visits	10%
Transversal competences (rubrics)	10-15%

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

7.1. First exam period

To pass the course in the first exam period, you must:

- Attend at least 50% of the lectures, with the exception of some special cases included in the School regulations.
- Obtain a final course grade of at least 5 out of 10 (weighted average).
- Obtain a grade greater than or equal to 4.5 out of 10 in the final exam.

In any case, you will need to obtain a grade of at least 5.0 in the final exam for it to count towards the final grade along with all the grades corresponding to the other activities.

7.2. Second exam period

Students who do not pass the course during the normal assessment period will have a second chance to retake the course in the Supplementary Exam Period. The same requirements and assessment rules mentioned in the previous section (regular assessment period) hold also in this period, with the exemption of the attendance requirement.

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at least 5.0 in the final exam for it to count towards the final grade along with all the grades corresponding to the other activities.

The student must deliver all the activities corresponding to the module failed in the first exam period, that is, the individual and class activities and the group project. They will carry out new activities of similar difficulty and length. These activities will be published in the Virtual Campus at the beginning of the Supplementary Exam Period.

In the case of the **group project**, if there are enough students to form a group, a new project will be proposed. If not, the project will be an individual project with a **maximum possible grade of 8 points out of 10** (due to the lack of teamwork).

8. SCHEDULE

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

Assessable activities	Deadline
Weekly Class Tests	Every week
Group Project on creating a software model with built in GUI	Weeks 7 to 9
Midterm	Week 6 to 7
Final Exam	Week 12 to 14
Visit/conference	To determine

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. BIBLIOGRAPHY

The main reference work for this subject is:

- STEWART J., Calculus: Concepts and Contexts. Brooks Cole, 4th edition.

The recommended Bibliography is:

- 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).
- APOSTOL, T. Calculus, Vol. I and Vol. 2. Editorial Reverte

- SPIVAK, M. Calculus. Editorial Reverte

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

From the Educational Guidance and Diversity Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by mean of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunity for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:
orientacioneducativa@universidadeuropea.es

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.