UAB Universitat Autònoma de Barcelona

Calculus

Code: 103796
ECTS Credits: 6

2025/2026

Degree	Type	Year
Electronic Engineering for Telecommunications	FB	1
Telecommunication Systems Engineering	FB	1

Contact

Name: Gil Solanes Farres

Email: gil.solanes@uab.cat

Teachers

Arturo Nicolau Nos

Iván Montero Arias

(External) Utpal Kumar Sarkar

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Although there are no official prerequisites, it is essential that students have a solid grasp of the most basic conc

Objectives and Contextualisation

Reach a sufficient level in calculus to deal with phenomena and solve mathematical problems posed in engineeri
Support the parts of the other subjects of the degree that require master
Achieve a sufficient level in the use of complex numbers and especially i

Learning Outcomes

1. KM01 (Knowledge) Identify elementary mathematical models and tools for calculus, linear algebra, and differential equations in telecommunications engineering.
2. KM01 (Knowledge) Identify elementary mathematical models and tools of calculus, linear algebra and differential equations in telecommunications engineering.
3. SM01 (Skill) Solve simple matrix calculation problems, linear equations and first-order differential equations in telecommunications engineering.
4. SM01 (Skill) Solve simple matrix calculus problems, linear equations and first-order differential equations in telecommunications engineering.
5. SM04 (Skill) Express oneself appropriately using the basic mathematical language in telecommunications engineering.
6. SM04 (Skill) Express themselves appropriately using basic mathematical language in telecommunications engineering.

Content

1. Complex numbers.

1.1 Trigonometric functions. Addition formulas. Identities. Inverse trigono
1.2 Trigonometric equations.
1.3 Complex numbers. Sum, product and inverse. Square roots. Quadrat
1.4 Modulus and argument. Euler's formula. Phasors.
1.5 Polynomials, roots and factorization. Fundamental theorem of algebr
2. Continuity
2.1 Continuity and limits.
2.2. Fundamental theorems of continuous functions. Exponential and log
3. Differential calculus
3.1 Derivatives of functions. Algebraic rules of derivation. Chain rule. Der
3.2 Mean value theorem and consequences. Interval of monotonicity.
3.3 Relative and absolute extremes. Optimization.
3.4 Calculating limits using derivation.
3.5 Taylor's formula.

3.6 Newton's method.

4. Integral calculus.

4.1 Notion of Riemann integral.
4.2 Fundamental Theorem of Calculus. Barrow's theorem.
4.3 Calculus of primitives.
4.4 Applications of integrals.
4.5 Multiple integration. Polar coordinates.
5. Differential equations.
5.1 Notion of differential equation.
5.2 Solving equations of separate variables.
5.3 First-order linear equations.
5.4 Second-order linear equations with constant coefficients.
5.5 Examples and word problems.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problem sessions	12	0.48	KM01, KM01, SM01, SM04
Theory lectures	36	1.44	KM01, KM01, SM01, SM04
Type: Autonomous			
Personal work	95.5	3.82	KM01, KM01, SM01, SM04

The course includes three hours of theory per week, which will be delivered in a traditional format using a blackboard. The theory instructor will present the main ideas of the various topics through examples and exercises.

Students will receive sets of exercises and problems that will be worked on during the weekly problem-solving class. Beforehand, as part of their independent study, students are expected to read and reflect on the proposed exercises and problems.

This approach will help ensure their participation in class and will facilitate the assimilation of procedural content.

The Virtual Campus will be the main channel of communication between instructors and students, and it will be important to check it daily.

Students will have access to tutoring and advisory services both online and in person (in-office hours). It is recommended that they make use of this support to keep track of the course.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
First midterm exam	40%	2	0.08	KM01, SM01, SM04
Follow-up tests	15%	2	0.08	KM01, SM01, SM04
Second midterm exam	45%	2.5	0.1	KM01, SM01, SM04

All assessment activities are individual. There will be no differentiated treatment for students who repeat the subject.

There will be two midterm exams, the first with a weight of 40% and the second with a weight of 45%. The grade obtained in these exams can be reviewed. In addition, during the course, part of some theory classes will be used to carry out small follow-up tests, of a rather conceptual nature. The resulting grade from these tests will have a weight of 15%.

In the event that the overall grade is less than 5, a remedial exam will be chosen where one of the three course grades, or all three together, can be reassessed.

Single assessment: a single exam will be given consisting of three parts corresponding to the two midterms and the follow-up tests. The weights of each part will be the same as in the continuous assessment. The same recovery system will be applied as for the continuous assessment.

The maximum grade for the remedial exam will be 7.5.Students will obtain the grade of "Not Assessable" when the assessment activities carried out have a total weight of less than 50%. Honors will be awarded at the discretion of the teaching staff.

Note on copies, plagiarism and other irregularities
Without prejudice to other disciplinary measures deemed appropriate, and in accordance with current academic regulations, irregularities committed by a student (for example plagiarizing, copying, allowing copying or having communication devices during assessment activities) that may lead to a variation in the grade will be graded with a zero (0). Assessment activities graded in this way and by this procedure will not be recoverable. The numerical grade of the transcript will be the lower value between 3.0 and the weighted average of the grades in the event that the student has committed irregularities in an assessment act (and therefore passing by compensation will not be possible).

Bibliography

1. F. Carreras, M. Dalmau, F. J. Albéniz, J. M. Moreno, Ecuaciones diferenciales, Ed. UAB, 1994.
2. N. Levinson i R. M. Redheer, Curso de variable compleja (Capítol 1) Ed. Reverté, 1981.
3. D. Pestana, J. Rodríguez, E. Romera, E. Touris, V. Álvarez, A. Portilla. Curso Práctico de Cálculo y Precálculo, Ed. Ariel, 2000.
4. S.L. Salas, E. Hille, Calculus Vol. 1, Ed. Reverté, 2002.
5. D. G. Zill, Ecuaciones Diferenciales con aplicaciones de modelado (6a ed.), International Thomson cop., 1997.

Software

No specific software will be used.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	311	Catalan/Spanish	first semester	morning-mixed
(PAUL) Classroom practices	312	Catalan/Spanish	first semester	morning-mixed
(PAUL) Classroom practices	331	Catalan/Spanish	first semester	morning-mixed
(PAUL) Classroom practices	332	Catalan/Spanish	first semester	morning-mixed
(PAUL) Classroom practices	351	Catalan/Spanish	first semester	afternoon

(PAUL) Classroom practices	352	Catalan/Spanish	first semester	afternoon
(TE) Theory	31	Catalan	first semester	morning-mixed
(TE) Theory	33	Catalan	first semester	morning-mixed
(TE) Theory	51	Catalan	first semester	afternoon