Universitat Autònoma de Barcelona

2020/2021

Calculus

Code: 103796
ECTS Credits: 6

Degree	Type	Year	Semester
2500895 Electronic Engineering for Telecommunication	FB	1	1
2500898 Telecommunication Systems Engineering	FB	1	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

Name: Joan Orobitg Huguet
Email: Joan.Orobitg@uab.cat

Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Joan Josep Carmona Domènech
Juan Jesús Donaire Benito
Francesc Mañosas Capellades
Silvia Cuadrado Gavilán
Gil Solanes Farrés
David Marín Pérez

Prerequisites

Although there are no official prerequisites, it is recommended that students have consolidated the knowledge of the Calculus taught in high school: limits, continuity and derivability of real functions of a real variable; notions of integral calculus and trigonometry.

Objectives and Contextualisation

To reach the sufficient level in calculation of a variable to treat phenomena and to solve the mathematical problems posed in the engineering that can be described in these terms.

To sustain the parts of the other subjects of the degree that require mastery of real functions of a variable. Achieve a sufficient level in the use of complex numbers.

Competences

Electronic Engineering for Telecommunication
- Communication

- Develop personal attitude.
- Develop personal work habits.
- Develop thinking habits.
- Learn new methods and technologies, building on basic technological knowledge, to be able to adapt to new situations.
- Work in a team.

Telecommunication Systems Engineering
- Communication
- Develop personal attitude.
- Develop personal work habits.
- Develop thinking habits.
- Learn new methods and technologies, building on basic technological knowledge, to be able to adapt to new situations.
- Work in a team.

Learning Outcomes

1. Apply, in the problems that arise in engineering, knowledge about linear algebra, geometry, differential geometry, differential and integral calculus, differential and partial derivative equations, numerical methods, numerical algorithms, statistics and optimisation.
2. Apply, to the problems that arise in engineering, knowledge of linear algebra, geometry, differential geometry, differential and integral calculus, differential and partial derivative equations, numerical methods, numerical algorithms, statistics and optimisation.
3. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
4. Develop curiosity and creativity.
5. Develop scientific thinking.
6. Develop the capacity for analysis and synthesis.
7. Manage available time and resources.
8. Manage available time and resources. Work in an organised manner.
9. Prevent and solve problems.
10. Resolve the mathematical problems that can arise in engineering.
11. Work autonomously.
12. Work cooperatively.
13. Work in an organised manner.

Content

1.- Complex numbers: Arithmetic of complex numbers. Geometric interpretation, module and argument of a complex number. Complex exponential. Polynomials: roots and factoring.

2.- Differential calculus and integral calculus: Calculation of derivatives: derivation rules and derivatives of elementary functions. Relations between a function and its derivative. Optimization of functions: relative ends and absolute extremes. Graphical representation of functions. Calculation of limits by the Hôpital. Taylor formula and applications. Calculation of primitives: relationship with the calculation of integrals. Applications of the integral: calculation of flat areas and volumes of revolution.

3.- Series: Successions and numerical series. Progressions Convergence criteria. Power series.

4.- Differential equations: Notion of differential equation and solution of a differential equation. First order differential equations resolvable in elementary form.

Methodology

The theory teacher will give the main ideas on the various subjects. The student must solve the proposed problems. The teacher of problems will solve the doubts that are put to him and will propose methods of solution. Throughout the semester will be special sessions (seminars) in which the student must solve and deliver problems similar to those that have been made in the classes of problems.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Theoretical classes and exercise classes	45	1.8	2, 1, 10
Type: Supervised			
Supervised special sessions	24	0.96	2, 1, 10
Type: Autonomous			
Personal work	76	3.04	5, 6, 9, 10, 11

Assessment

The competences will be evaluated by:

Two written exams (P1 and P2) on the practices and on the theoretical concepts taught in theory and problem classes.
P1 with a global weight of 40% of the final grade and P2 with an overall weight of 45%.
All students who complete the midterm P1 can no longer be classified as NOT EVALUABLE. The student who has not taken this P1 exam
it will be considered as NOT EVALUABLE for academic purposes and will not have the right to recover it (except for duly justified cause in which the recovery exam will be allowed).
There will be a recovery for each of these evaluation activities.
There will also be a final evaluation on the material of the seminars with a global weight of 15% of the grade. This activity will not be recoverable.

To approve the subject it will be necessary:
1. Obtain a minimum grade of 3 in each of the partial tests.
2. P1 * 0.40 + P2 * 0.45 + (Note Seminar) * 0.15 $\geq$ 5

Therefore, to be able to pass the subject it is essential to get a grade of not less than 3 in each of the midterm exams or their recoveries.
In another case the maximum note that can be obtained will be a 4.

The dates and terms of the evaluation activities will be fixed, with sufficient advance and as appropriate, by the Grade Coordination or by the faculty responsible for the subject. Those that the faculty summons will be annotated the Virtual Campus (CV) and can be subject to possible changes of programming for reasons of adaptation to possible incidents; inform the CV about these changes as it is understood that the CV is the usual mechanism of exchange of information between teacher and students.

For each evaluation activity, a place, date and time of revision in which the student can review the activity with the teacher will be indicated. In this context, claims may be made on the activity grade, which will be evaluated by the faculty responsible for the subject. If the student does not appear in this review, this activity will not be reviewed later.

These evaluation conditions will be the same for all students enrolled in the subject, regardless of whether they are enrolled first or if they had already enrolled in previous courses.

Without prejudice to other disciplinary measures deemed appropriate, and in accordance with current academic regulations, irregularities committed by a student that may lead to a variation of the grade will be scored with a zero (0). For example, plagiarizing, copying, copying, having communication devices (such as mobile phones, smart watches, etc.) in an evaluation activity will imply suspending this evaluation activity with a zero (0). The evaluation activities qualified in this way and by this procedure will not be recoverable. If it is necessary to pass any of these evaluation activities to pass the subject, this subject will be suspended directly, without the opportunity to recover it in the same course. The numerical note of the file will be the lower value between 3.0 and the weighted average of the marks in case the student has committed irregularities in an evaluation act (and therefore the approved by compensation will not be possible).

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of seminars	15%	1	0.04	2, 1, 3, 5, 6, 4, 7, 8, 9, 10, 12, 11, 13
Midterm Exam 1	40%	2	0.08	2, 1, 3, 5, 6, 4, 7, 8, 9, 10, 11, 13
Midterm Exam 2	45%	2	0.08	2, 1, 10

Bibliography

1. F. Carreras, M. Dalmau, F. J. Albeniz, J. M. Moreno, Ecuaciones diferenciales, Ed. UAB, 1994.
2. N. Levinson i R. M. Redheer, Curso de variable compleja (Captol 1) Ed. Reverte, 1981.
3. D. Pestana, J. Rodrguez, E. Romera, E. Touris, V. Alvarez, A. Portilla. Curso Practico de Calculo y Precalculo, Ed. Ariel, 2000.
4. S.L. Salas, E. Hille. Calculus Vol. 1, Ed. Reverte, 2002.
5. D. G. Zill, Ecuaciones Diferenciales con aplicaciones de modelado (6a ed.), International Thomson cop., 1997.