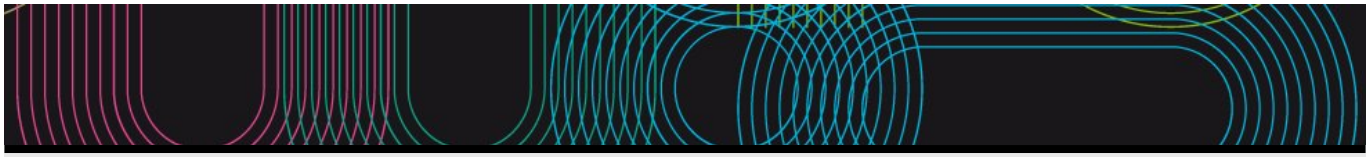

IDENTIFYING DATA				
Mathematics: Calculus II				
Subject	Mathematics: Calculus II			
Code	V05G300V01203			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	Spanish			
Department				
Coordinator	García Lomba, Guillermo			
Lecturers	García Lomba, Guillermo Martín Méndez, Alberto Lucio Martínez Varela, Áurea María Prieto Gómez, Cristina Magdalena			
E-mail	guille@dma.uvigo.es			
Web	http://faitic.uvigo.es/			
General description	The matter of Calculus II of the Degree in Engineering of Technologies of Telecommunication provides basic and common training to the branch of the telecommunication. Such as it figures in the memory of the degree, students should be able to formulate, to solve and to interpret mathematically problems within engineering of telecommunication at the end of the lectures. For this, they should know how to calculate integrals of functions of one and several variables and its meaning and they should handle the basic numerical methods of approximation for this kind of integrals. On the other hand, they should become familiar with the developments of functions in Fourier series. Also, they will have to know how to solve differential equations of first and second order. Finally, they should know to handle the Laplace transform in order to solve differential equations. All of these contents are notable for several matters that they must to study simultaneously or later in the degree.			

Competencies	
Code	
A3	CG3: The knowledge of basic subjects and technologies that capacitates the student to learn new methods and technologies, as well as to give him great versatility to confront and update to new situations
A4	CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.
A10	CE1/FB1: The ability to solve mathematical problems in Engineering. The aptitude to apply knowledge about linear algebra, geometry, differential geometry, differential and integral calculus, differential and partial derivatives equations; numerical methods, numerical algorithms, statistics and optimization

Learning aims	
Expected results from this subject	Training and Learning Results
CE1/FB1 Capacity for the resolution of mathematical problems that can be posed in the engineering. FB1.2 Aptitude to apply the knowledges on differential and integral calculus. FB1.3 Aptitude to apply the knowledges on differential equations and in partial differential equations. FB1.4 Aptitude to apply the knowledges on numerical methods and algorithms.	A10
CG3 Knowledge of basic matters and theories that qualify the student for the learning of new methods and technologies, as well as that it endow him with a big versatility of adaptation to new situations.	A3

CG4 Capacity to solve problems with initiative, to take decisions, the creativity, and to communicate and transmit knowledges and skills.	A4

Contents

Topic	
Theme 1. Integral calculus in R.	The Riemann integral Integrable functions. The fundamental theorem of the integral calculus. The theorem of the half value. The rule of Barrow. Calculus of primitives: integration by parts and change of variable. Improper integrals.
Theme 2. Orthogonal functions and Fourier series.	Orthogonal functions. Fourier series. Developments of Fourier series for odd and even functions. Convergence. The Fourier transform.
Theme 3. Numerical integration.	Interpolatory quadratures. Properties. Error of interpolation. Particular cases: Poncelet, tapezoidal and Simpson formulas. Formulas of composite quadrature.
Theme 4. The multiple integral in the sense of Riemann.	The double and triple integrals in elementary regions. Change of the order of integration. Theorems of change of variable. Cylindrical and spherical coordinates. Applications.
Theme 5. Introduction to ordinary differential equations.	Differential equations. Generalities Concept of solution. Differential equations of first order. Existence and uniqueness of solution. Autonomous equations. Separate variables. Homogeneous equations. Exact equations. Linear equations. Families of curves and orthogonal paths.
Theme 6. Ordinary differential equations of second order.	Differential equations of second order and of upper order. Homogeneous and non homogeneous linear differential equations. Linear differential equations with constant coefficients. Indeterminate coefficients. Variation of parameters. Cauchy-Euler equation.
Theme 7. The Laplace transform.	Definition of the Laplace transform. Properties. Application to the solution of differential equations.

Planning

	Class hours	Hours outside the classroom	Total hours
Troubleshooting and / or exercises	17	17	34
Laboratory practises	3	6	9
Master Session	28	56	84
Troubleshooting and / or exercises	5	10	15
Practical tests, real task execution and / or simulated.	1	1	2
Troubleshooting and / or exercises	2	4	6

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Troubleshooting and / or exercises	In these hours of work the professor will solve problems of each one of the subjects and will enter new methods of solution no contained in the master classes from a practical point of view. The student also will have to solve problems proposed by the professor with the aim to apply the obtained knowledges.
Laboratory practises	In these practices, the computer tools MATLAB or MAXIMA will be used to study and to apply the numerical methods of approximation of integrals described in the Theme 3 of the matter.
Master Session	The professor will expose in this type of classes the theoretical contents of the matter.

Personalized attention

Methodologies	Description
Master Session	The professor will attend personally the doubts and queries of the students. He will solve doubts in his office, in the classes of problems, and in the laboratory. Also the Web platform Faitic will be used to help the students. They will have occasion of to attend tutorial sessions in a timetable established at the beginning of the course and which will be published in the Web page of the department.
Troubleshooting and / or exercises	The professor will attend personally the doubts and queries of the students. He will solve doubts in his office, in the classes of problems, and in the laboratory. Also the Web platform Faitic will be used to help the students. They will have occasion of to attend tutorial sessions in a timetable established at the beginning of the course and which will be published in the Web page of the department.
Laboratory practises	The professor will attend personally the doubts and queries of the students. He will solve doubts in his office, in the classes of problems, and in the laboratory. Also the Web platform Faitic will be used to help the students. They will have occasion of to attend tutorial sessions in a timetable established at the beginning of the course and which will be published in the Web page of the department.

Assessment

	Description	Qualification
Troubleshooting and / or exercises	Five "one hour sessions", in which the competencies A10/FB1, A3/CG3 y A4/CG4 will be assessed. - 1st session: Theme 1 (4th week aprox.) - 2nd session: Theme 2 (8th week aprox.) - 3rd session: Theme 4 (11th week aprox.) - 4th session: Theme 5 (13th week aprox.) - 5th session: Theme 6 (15th week aprox.) These five sessions account for 35% of the score with the following weights: - First: 10% (1 point) - Second: 5% (0,5 points) - Third: 10% (1 point) - Forth: 5% (0,5 points) - Fifth: 5% (0,5 points)	35
Practical tests, real task execution and / or simulated.	The students will do a practice of laboratory of the Theme 3 using MATLAB or MAXIMA (8th week aprox.), in which the competency FB1.4/A10 will be assessed. Its value will be of 5% (0,5 points)	5
Troubleshooting and / or exercises	Final examination of the Themes 4, 5, 6 and 7, in which the competencies A10/FB1, A3/CG3 y A4/CG4 will be assessed. Its value will be of 60% of the score (6 points)	60

Other comments on the Evaluation

The evaluation will preferably be continuous. The student will be enrolled in this kind of assessment if he attends the first evaluable session. Once enrolled, it is impossible to unsubscribe from continuous assessment.

The exams of continuous evaluation are not recoverable, ie, if a student can not assist to the test in the date stipulated by the teacher, it is impossible to require the repetition. Before performing each test, both the approximate date of publication of the qualifications and the date and procedure for review them will be communicated. The score obtained at the evaluable tasks will be only valid for the academic year in which the student make them.

In tests of continuous assessment the student will solve problems and exercises of the topics of matter.

1. Continuous assessment.

The final score for a student who makes continuous assessment is given by the formula

N = C + E

C: Note obtained by adding the scores of the six sessions of the items 1, 2, 3, 4, 5 and 6.
E: Note of the final examination of the items 4, 5, 6 and 7.

In this mode **a student will pass the subject when N is greater than or equal to 5**.

2. Final evaluation of the semester.

Those students who fail to continuous assessment may be submitted to a final exam of all topics in the subject on the same

date that the final exam of continuous assessment. In this exam the competencies A10/FB1, A3/CG3 y A4/CG4 will be assessed.

These students will be evaluated from 0 to 10 points and **theywill pass the subject when the obtained score is greater than or equal to 5**.

3. Recovery of July.

In the recovery day, students who chose continuous assessment may choose, if desired, for an exam of the items 4, 5, 6 and 7, in which the competencies A10/FB1, A3/CG3 y A4/CG4 will be assessed. The final grade is obtained as

NR = C + ER

C: Note obtained by adding the scores of the six sessions of the items 1, 2, 3, 4, 5 and 6.
ER: Note the final recovery examination of the items 4, 5, 6 and 7.

In this mode a student **will pass the subject when NR is greater than or equal to 5**.

If they do not choose that option, the student will be assessed in all the issues on the subject. In this exam the competencies A10/FB1, A3/CG3 y A4/CG4 will be assessed.

In this other method they will be evaluated from 0 to 10 points. A student **will pass the subject when the obtained score is greater than or equal to 5**.

4. Qualification of not presented.

Finally, a student is considered not presented **if he is not enrolled in the continuous assessment and he does not attend any of the examinations** of the subject. Otherwise he is considered presented.

Sources of information

D. Zill & W.S. Wright, **Cálculo de una variable**, 4ª,
E. Marsden & A.J. Tromba, **Cálculo vectorial**, 5ª,
D.G. Zill & M.R. Cullen, **Ecuaciones diferenciales**, 3ª,
A. Quarteroni & F. Saleri, **Cálculo científico con Matlab y Octave**, 1ª,

Recommendations

Subjects that are recommended to be taken simultaneously

Physics: Analysis of Linear Circuits/V05G300V01201
Physics: Fields and Waves/V05G300V01202
Mathematics: Probability and Statistics/V05G300V01204

Subjects that it is recommended to have taken before

Mathematics: Linear Algebra/V05G300V01104
Mathematics: Calculus I/V05G300V01105