

IDENTIFYING DATA				
Mathematics: Calculus II				
Subject	Mathematics: Calculus II			
Code	V09G310V01204			
Study programme	(*)Grao en Enxeñaría dos Recursos Mineiros e Enerxéticos			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	Spanish			
Department				
Coordinator	Álvarez Vázquez, Lino José			
Lecturers	Álvarez Vázquez, Lino José Martínez Varela, Áurea María			
E-mail	lino@dma.uvigo.es			
Web	http://faitic.uvigo.es			
General description	In the subject of Calculus II of the Degree in Engineering of the Mining and Energetic Resources provides basic and common training to the branch of the engineering. Such and how features in the memory of the degree, after finalizing the subject the student will have to be able to formulate, resolve and interpret mathematically own problems of the engineering. Stop this, when surpassing the subject, will owe to know calculate integrals of functions of an and of varied variables, know his meaning and dominate the basic numerical methods of approximation of integrals. On the other hand, it has to be used with the handle and resolution of differential equations of first order and upper. All these contents are relevant for varied subjects that owes to study simultaneously or later in the qualifications.			

Competencies
Code
C1
C7
C9
D1
D4
D5
D10

Learning outcomes		
Expected results from this subject	Training and Learning Results	
The objective that pursues this subject is that the student purchase the dominance of the basic techniques of the integral calculation and his applications. This subject expects that the students learn to: - Comprise the basic bases of the theory of the integration of functions of an and several variables. - Handle the elementary techniques of integration of ordinary differential equations.	C1 C7 C9	D1 D4 D5 D10

Contents	
Topic	
1. Integral calculation of functions of one variable.	Generalities: The integral of Riemann. Integrable functions. Main theorem of the integral calculation. Theorem of the mean value. Rule of Barrow. Calculation of primitives: integration by parts and change of variable. Improper integrals.

2. Numerical methods of integration in R.	Formulas of Quadrature of polynomial type. Properties. Error of interpolation. Particular cases: Poncelet, Trapece and Simpson. Formulas of quadrature compound.
3. Integral calculation of functions of several variables.	Double and triple integrals in elementary regions. Change of the order of integration. Change of variable. Polar coordinates. Cylindrical and spherical coordinates.
4. Ordinary differential equations.	Generalities on ordinary differential equations. Concept of solution. First order equations. Existence and uniqueness of solution. Autonomous equations. Equations in separate variables. Homogeneous equations. Exact equations. Linear equations. Families of curves: orthogonal trajectories.
5. Ordinary differential equations of upper order.	Differential equations of second order and upper order. Linear equations homogeneous and non-homogeneous. Linear equations with constant coefficients. Method of indeterminate coefficients. Method of variation of parameters. Equation of Cauchy-Euler.
6. Numerical methods for ordinary differential equations.	Methods for problems of initial value: methods of one step, methods multi-step, methods predictor-corrector. Methods for boundary problems: Methods of shot, methods of finite differences.
7. Introduction to the partial derivative equations.	Classification: elliptic, hyperbolic and parabolic equations. Problems with boundary values and problems of initial value. Examples: equation of Laplace, heat equation and wave equation.

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	30	60	90
Troubleshooting and / or exercises	10	20	30
Laboratory practises	5	8.75	13.75
Troubleshooting and / or exercises	5	8.75	13.75
Long answer tests and development	2.5	0	2.5

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

Methodologies

	Description
Master Session	The professor will expose in this type of kinds the theoretical contents of the subject.
Troubleshooting and / or exercises	In these hours of work the professor will resolve problems of each of the subjects and will enter new methods of resolution no contents in the master sessions from a practical point of view. The student also will owe to resolve problems proposed pole professor with the objective to apply the knowledges purchased.
Laboratory practises	In these practices will use the tool computing MATLAB (or another similar) to study the numerical methods of approximation of integrals and of resolution of ordinary differential equations described in units 2 and 6.

Personalized attention

Methodologies	Description
Troubleshooting and / or exercises	The professor will attend personally the doubts and queries of the students. Will attend doubts so much of presence form, especially in the classes of problems and laboratories, as of non-personal form by means of the platform Faitic.
Laboratory practises	The professor will attend personally the doubts and queries of the students. Will attend doubts so much of presence form, especially in the classes of problems and laboratories, as of non-personal form by means of the platform Faitic.
Master Session	The professor will attend personally the doubts and queries of the students. Will attend doubts so much of presence form, especially in the classes of problems and laboratories, as of non-personal form by means of the platform Faitic.

Assessment

	Description	Qualification	Training and Learning Results

Troubleshooting and / or exercises	The evaluation will be preferably continuous. The student, in the first weeks of kind, will deliver to the teaching staff of the subject a form to enrol in this type of evaluation. Once expressed his I wish to by writing of not taking part, no longer will be able to gave of high of the continuous evaluation. The continuous evaluation features of the proofs that detail the continuation and in the that the student will resolve, along the 10 practices of laboratory, problems and exercises of the are afraid indicate in the following points: * Four sessions of problems of an hour: First session: Subject 1 (practical of the week 2) Second session: Subject 3 (practical of the week 5) Third session: Subject 4 (practical of the week 7) Fourth session: Subject 5 (practical of the week 9) * Two sessions of laboratory of half hour: First session: Subject 2 (practical of the week 3) Second session: Subject 6 (practical of the week 10) These six proofs sum a 30% of the note having each a weight of a 5%. Learning outcomes: Comprise the basic bases of the theory of the integration of functions of an and several variables, and handle the elementary techniques of integration of ordinary differential equations.	30	C1 C7 C9	D4
Long answer tests and development	This proof is the final examination of the continuous evaluation, that will be done once finished the classes, with one weigh of 70% of the note, in the dates fixed by the Together of School (what can be consulted in the page web of the Centre). Learning outcomes: Comprise the basic bases of the theory of the integration of functions of an and several variables, and handle the elementary techniques of integration of ordinary differential equations.	70	C1 C7 C9	D1 D4 D5 D10

Other comments on the Evaluation

Sources of information

J. Stewart, **Cálculo: Conceptos y contextos**, Thomson,

E. Marsden - A.J. Tromba, **Cálculo vectorial**, Pearson-Addison,

D.G. Zill - M.R. Cullen, **Matemáticas avanzadas para ingeniería: Ecuaciones diferenciales**, McGraw□Hill,

A. Quarteroni - F. Saleri, **Cálculo científico con Matlab y Octave**, Springer,

Recommendations

Subjects that are recommended to be taken simultaneously

IT: Statistics/V09G290V01203

Subjects that it is recommended to have taken before

Mathematics: Linear algebra/V09G290V01103

Mathematics: Calculus I/V09G290V01104