



## IDENTIFYING DATA

### Mathematics: Calculus II

Subject	Mathematics: Calculus II			
Code	O07G410V01201			
Study programme	Grado en Ingeniería Aeroespacial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	#EnglishFriendly Galician			
Department				
Coordinator	Cid Iglesias, María Begoña			
Lecturers	Cid Iglesias, María Begoña			
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Web	<a href="http://aero.uvigo.es/gl/">http://aero.uvigo.es/gl/</a>			

**General description** The objective of the subject is that the students know and dominate the basic techniques of the integral calculus, vector calculus, ordinary differential equations and their applications, necessary both for other subjects of the qualifications and the professional exercise.

English Friendly subject: International students may request from the teachers:

- a) materials and bibliographic references in English,
- b) tutoring sessions in English,
- c) exams and assessments in English.

## Training and Learning Results

Code	
A1	That the students demonstrate to possess and understand knowledge in an area of study that is part of the general education (second level), and often found at a level that, although based on advanced textbooks, also includes some aspects that involve knowledge from the avant-garde of the field of study
B2	Planning, documentation, project management, calculation and manufacturing in the field of aeronautical engineering (in accordance with what is established in section 5 of order CIN / 308/2009), aerospace vehicles, propulsion systems, aerospace materials, airport infrastructures, air navigation infrastructures and space management, air traffic and transport management systems.
C1	Capability to solve mathematical problems that may arise in engineering. Aptitude to apply the knowledge about: linear algebra; geometry; differential geometry; differential and integral calculation; differential equations and partial derivatives; numerical methods; numerical algorithm; statistics and optimization.
C32	Appropriate knowledge applied to engineering: methods of calculation and development of materials and defence systems; management of experimental techniques, equipment and measuring instruments; numerical simulation of the most significant physical-mathematical processes; inspection, quality control and fault detection techniques; their most appropriate methods and repair techniques.
D1	Capability of analysis, organization and planification.
D3	Capability of oral and written communication in native language
D4	Capability of autonomous learning and information management
D5	Capability to solve problems and draw decisions
D6	Capabiliity for interpersonal communication
D8	Capabiliity for critical and self-critical reasoning

## Expected results from this subject

Expected results from this subject	Training and Learning Results
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Knowledge and understanding of the main concepts and techniques of the integral calculus in several variables.	A1	B2	C1 C32	D1 D3 D4 D5 D6 D8
Knowledge and understanding of the models that adopt the form of ordinary differential equations and the main elementary techniques of integration.	A1	B2	C1 C32	D1 D3 D4 D5 D6 D8
Knowledge, understanding and application of the numerical methods of resolution of the models and typical problems of the aerospace technology; in concrete, polynomial interpolation, numerical differentiation and the resolution of ordinary differential equations.	A1	B2	C1 C32	D1 D3 D4 D5 D6 D8

### Contents

Topic	
Multiple integrals. Fubini's theorem. Change of variable.	Multiple integrals. Fubini's theorem. Change of variable.
Line and surface integrals.	Line and surface integrals.
Gauss' and Stokes' theorems	Gauss' and Stokes' theorems
Introduction to the ordinary differential equations. Existence and uniqueness.	Introduction to the ordinary differential equations. Existence and uniqueness.
Linear systems and systems with constant coefficients.	Linear systems and systems with constant coefficients.
Numerical resolution of ordinary differential equations.	Numerical resolution of ordinary differential equations.
Polynomial interpolation.	Polynomial interpolation.

### Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	1	2
Lecturing	28	56	84
Problem solving	15	15	30
Autonomous problem solving	0	13.5	13.5
Practices through ICT	6	12	18
Essay questions exam	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
Introductory activities	Activities to make contact and gather information on the students, and to present the subject.
Lecturing	The professor will present in the theoretical classes the contents of the subject. Students will have basic reference texts for tracking the subject.
Problem solving	The professor will solve problems and exercises manually and the student will have to solve similar exercises to acquire the necessary skills.
Autonomous problem solving	The students will have to solve exercises independently to check the acquisition of the skills.
Practices through ICT	The professor will solve problems and exercises with computer tools and the student will have to solve similar exercises to acquire the necessary skills.

### Personalized assistance

Methodologies	Description
Lecturing	The professor will personally solve the doubts of students. The doubts will be solved in-person, specially during problems and laboratory lectures and during tutorials, and also by using the remote options available for the course.
Problem solving	The professor will personally solve the doubts of students. The doubts will be solved in-person, specially during problems and laboratory lectures and during tutorials, and also by using the remote options available for the course.

Autonomous problem solving	The professor will personally solve the doubts of students. The doubts will be solved in-person, specially during problems and laboratory lectures and during tutorials, and also by using the remote options available for the course.
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<b>Assessment</b>						
	Description	Qualification	Training and Learning Results			
Autonomous problem solving	There will be a written test for each of the parts of the subject in order to evaluate the resolution of exercises and/or problems in an autonomous way. Each test will have a weight of 25%. RA1, RA2, RA3	50	A1	B2	C1 C32	D1 D3 D4 D5 D6 D8
Practices through ICT	Attendance and correct completion of the practical exercises using computer programmes. RA3	10			C1	D1 D4 D5 D8
Essay questions exam	Completion of a final exam in which the contents corresponding to the master sessions and problem solving are collected. RA1, RA2	40	A1	B2	C1 C32	D1 D3 D4 D5 D8

### **Other comments on the Evaluation**

The preferred mode of assessment is continuous assessment. The student has the right to opt for the overall assessment (100% of the grade on the official date) according to the procedure and deadline established by the centre for each call.

In any call it is necessary to obtain 5 points to pass the subject. The maximum duration of any exam will be 3 hours. Since the subject has two distinct parts, it will be necessary to have a minimum of 2 points out of 5 in each part. In the case of obtaining a grade lower than 2 points in any of the parts, the final grade that will appear in the certificate will be the sum of both notes limiting it to a maximum of 4.8 points. (\*)

#### **Second call evaluation:**

An exam in which the learning outcomes and the attainment of the competences indicated in the teaching guide will be assessed. indicated in the teaching guide. The exam will provide 90% of the grade. In case of having obtained a minimum of 3 points in one part (and not having obtained 2 points in the other part), the student can choose to take only the failed part or the whole exam. The criterion indicated in (\*) will also apply.

The student may choose to maintain the grade obtained in the continuous assessment of the practical part or to take a specific test again to complete the practical part of the exam. again a specific test to complete the remaining 10% of the grade.

#### **Exam-only assesment procedure (any call):**

An examination will be carried out to assess the learning outcomes and the achievement of the competences indicated in the teacher's guide. This exam will provide 100% of the rating of this call. The criterion indicated in (\*) will also apply.

#### **Evaluation dates:**

The evaluation schedule officially approved by the EEAE is published on the website <http://aero.uvigo.es/es/docencia/examenes/>

It is expected that the students present a suitable ethical behaviour. In case to detect an ethical behaviour no suitable (copy, plagiarism, utilisation of electronic devices non authorised, and others) will consider that the student does not gather the necessary requirements to surpass the subject. In this case the global qualification in the present academic course will be of suspense (0.0).

It remembers the prohibition of the use of mobile devices or portable computers in exercises and practical since the Royal decree 1791/2010, of 30 December, by which approves the Statute of the University Student, establishes in his article 13.2.d), relative to the duties of the university students, the duty of :

*"Abstain of the utilisation or cooperation in fraudulent procedures in the proofs of evaluation, in the works that realise or in official documents of the university".*

### **Sources of information**

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**Basic Bibliography**

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E. Marsden, A.J. Tromba, **Cálculo Vectorial**, Pearson, 2004

R. Larson, B.H. Edwards, **Cálculo 2 de varias variables**, 10ª, McGraw-Hill, 2016

G.F. Simmons, **Ecuaciones Diferenciales con aplicaciones y notas históricas**, McGraw-Hill, 1993

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**Complementary Bibliography**

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A. García et al., **Cálculo II**, CLAGSA, 2002

D.G. Zill, **Ecuaciones diferenciales con aplicaciones de modelado**, 9ª, International Thomson Edit., 2009

A. García et al., **Ecuaciones diferenciales ordinarias**, CLAGSA, 2006

D. Kincaid, W. Cheney, **Análisis numérico: las matemáticas del cálculo científico**, Addison-Wesley Iberoamericana, 1994

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**Recommendations**

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**Subjects that continue the syllabus**

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Mathematics: Mathematical methods/O07G410V01301

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**Subjects that are recommended to be taken simultaneously**

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Physics: Physics II/O07G410V01202

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**Subjects that it is recommended to have taken before**

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Physics: Physics I/O07G410V01103

Mathematics: Linear algebra/O07G410V01102

Mathematics: Calculus I/O07G410V01101

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**Other comments**

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It is recommended attend to class and work the contents weekly.

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