



## IDENTIFYING DATA

### Mathematics: Calculus I

Subject	Mathematics: Calculus I			
Code	007G410V01101			
Study programme	(*)Grao en Enxeñaría Aeroespacial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Galician English			
Department				
Coordinator	Area Carracedo, Iván Carlos			
Lecturers	Area Carracedo, Iván Carlos			
E-mail	area@uvigo.es			
Web	<a href="http://area.webs.uvigo.es">http://area.webs.uvigo.es</a>			
General description	The aim of this course is that the student acquires the techniques of differential calculus both in one and several variables, and integral calculus in one variables, necessary both for other courses of the degree and for professional practice.			

## Competencies

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	Capability for interpersonal communication
D8	Capability for critical and self-critical reasoning

## Learning outcomes

Expected results from this subject	Training and Learning Results			
Knowledge and understanding of the main concepts and techniques of differential calculus in one and several variables as well as of integral calculus in one variable and numerical integration	A1	B2	C1 C32	D1 D3 D4 D5 D6 D8

**Contents**

Topic	
Functions of one real variable.	Functions of one real variable. Limits. Continuity.
Differentiability of functions of one real variable. Mean value theorems. Limited expansions and Taylor's formula. Extrema.	Differentiability of functions of one real variable. Mean value theorems. Limited expansions and Taylor's formula. Extrema.
Integration of functions of one real variable	Primitives. Definite integral. Fundamental theorem of calculus. Geometric applications. Numerical integration
Sequences and series.	Sequences and series. Convergence. Numeric series of positive terms. Convergence criteria. Power series.
Functions of several real variables.	The n-dimensional euclidean space. Functions of several real variables. Limits. Continuity. Differentiability. Expansion and Taylor's formula. Relative extrema. Constrained optimization.

**Planning**

	Class hours	Hours outside the classroom	Total hours
Lecturing	18	36	54
Problem solving	14	26.6	40.6
Introductory activities	1	1.4	2.4
Autonomous problem solving	5	9.5	14.5
Laboratory practical	12	24	36
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
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.
Introductory activities	Activities to make contact and gather information on the students, and to present the subject.
Autonomous problem solving	The students will have to solve exercises independently to check the acquisition of the skills.
Laboratory practical	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.
Laboratory practical	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.

**Assessment**

Description	Qualification	Training and Learning Results
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Autonomous problem solving	Written tests and / or work to assess will be made to evaluate solving exercises and / or problems autonomously.	40	A1	B2	C1 C32	D1 D3 D4 D5 D6 D8
Essay questions exam	A final exam on the contents of all the course will be made.	60	A1	B2	C1 C32	D1 D3 D4 D5 D8

### Other comments on the Evaluation

It is required to obtain at least 30% of the maximum of the mark of each of the blocks of the subject to pass the exam. The final exam will last at most 3 hours if there is no break or 5 hours if there is an intermediate break (being 3 hours the maximum for each part)

The evaluation system of June-July is the same as in December-January, maintaining the grades obtained for the resolution of problems and/or exercises and class attendance and participation.

Non-attending students to classes can take an exam in both December and July that covers 100% of the final grade

The dates of the final exams are published on the website of the Escola de Enxeñaría Aeronáutica e do Espazo.

Ethical commitment:

"It is expected is that students present an adequate ethical behavior. If a not appropriate ethical behavior is detected (copying, plagiarism, non authorized use of electronic devices, etc.) the student will not meet the requirements to pass the course. In this case the overall rating in the current academic year will be suspense (0.0). If necessary, a new exam to verify the acquisition of skills and knowledge by the student(s) involved could be performed."

It is recalled the prohibition of the use of mobile devices or laptops in exercises and practices since Real Decreto 1791/2010, of December 30, approving the Statute of University Students, establishes in its article 13.2.d), concerning the duties of university students, the duty to:

*"Refrain from using or cooperating in fraudulent proceedings in the evaluation tests, in the works that are carried out or in official documents of the university".*

### Sources of information

#### Basic Bibliography

J. Burgos, **Cálculo Infinitesimal de una variable**, McGraw-Hill, 2007  
J. Burgos, **Cálculo Infinitesimal de varias variables**, McGraw-Hill, 2008  
R. Larson et al., **Cálculo 1**, McGraw-Hill, 2010  
R. Larson et al., **Cálculo 2**, McGraw-Hill, 2010  
J. Rogawski, **Cálculo. Una variable**, Reverté, 2012  
J. Rogawski, **Cálculo. Varias variables**, Reverté, 2012

#### Complementary Bibliography

A. García et al., **Cálculo I**, CLAGSA, 2007  
A. García et al., **Cálculo II**, CLAGSA, 2002

### Recommendations

#### Subjects that continue the syllabus

Physics: Physics II/O07G410V01202  
Mathematics: Calculus II/O07G410V01201  
Aerospace technology/O07G410V01205

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

Physics: Physics I/O07G410V01103  
Computer science/O07G410V01104  
Mathematics: Linear algebra/O07G410V01102