COURSE DATA

DATA SUBJECT

Code: 36407
Name: Mathematical analysis
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1406 - Degree in Data Science	Escola Tècnica Superior d'Enginyeria	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1406 - Degree in Data Science	Mathematics	BASIC

COORDINATION

MIRALLES MONTOLIO ALEJANDRO

SUMMARY

The subject Mathematical Analysis is framed within the basic scientific training that every student of engineering must acquire before fully entering into the specific questions of the degree. The basic objective is to provide a mathematical training that allows to correctly base the necessary knowledge in the Degree in Data Science.

In this subject, the classical contents of mathematical analysis are developed: Basic concepts of functions, sequences and series, differential and integral calculus and an introduction to the functions of several real variables.

Theory lessons will be taught in Spanish and practical and laboratory lessons as according to the information sheet available on the web of the degree.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

To successfully complete this subject, students should know the contents of Mathematics I and II taught in upper secondary education.

COMPETENCES / LEARNING OUTCOMES

1406 - Degree in Data Science

(CE01) Ability to solve the mathematical problems that can be posed in data science and be able to apply knowledge on: linear algebra, differential and integral calculus and numerical methods and optimisation.

(CG01) Knowledge of basic subjects and technologies that enable students to learn new methods and technologies, and to provide them with versatility to adapt to new situations.

(CG05) Analysis and synthesis capability in the preparation of reports and in the defence of ideas.

(CT03) Ability to defend your own work with rigor and arguments and to expose it in an adequate and accurate way with the use of the necessary means.

Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.

DESCRIPTION OF CONTENTS

1. Functions of a real variable

Definition and basic concepts.
Elementary functions
Operations with functions.

2. Sequences and series

Sequences of real numbers.
Calculation of limits.
Series of real numbers.
Convergence criteria.

3. Differential calculus

Differential calculus.

Concept of derivative.
Geometric interpretation, tangent line.
Derivation of elementary functions.
Algebraic properties for calculating derivatives, rule of the chain.
Taylor series.

4. Integral calculus

Integral calculus.
Finding immediate primitives.
Integration by parts.
Integration with change of variables.
Integrals of rational functions.
Fundamental theorem of calculus.
Definite integrals.
Applications.

5. Functions of several variables

Functions of several variables.
Basic concepts of the Euclidean space RxR, and functions of several variables.
Partial and directional derivatives.
Gradient and Hessian.
Tangent plane.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	28,00
Laboratory	20,00
Classroom practices	12,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	20,00
Independent study and work	50,00
Preparation of lessons	10,00
Preparation for assessment activities	10,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

Theory contents and adequate tools for problem solving will be gradually introduced and developed (CG01, CE01). A series of results, questions and problems will be proposed for students to be solved by applying the concepts presented in theory lessons (CG02, CG07, CE01). Students will present their solutions to the problems proposed (CT03).

A computer software pack for symbolic calculus will be used to supplement theory lessons, both visually and conceptually and regarding problem solving. This should also be useful as an experimentation method which may provide an improvement of intuitive knowledge (CG01, CG02).

The teaching methodology is based on the following strategies:

a) Lectures

b) Interactive activities: problem-based independent learning.

Theoretical activities

Lectures (single group)

Practical activities

Problem solving (single group)

Laboratories

Working in the classroom computer (in several subgroups)

EVALUATION

The evaluation criteria for the subject is based on and follows the recommendations of the AC2PI model of the ETSE-UV.

The evaluation of the learning will be made taking into account the participation of students during the course and through a final exam. The final grade of the subject will be done with the following criteria:

(A) The final exam has a weight of 35% of the final grade. It will be necessary to obtain a minimum of 4 out of 10 in the final exam in order to pass the course (CB2, CG01, CG02, CT02, CT03, CE01).

(B) Continuous assessment:

(B1) Submission of laboratory work (a compulsory, non-recoverable activity accounting for 30% of the final grade, CB2, CG01, CT03, CE01).

(B2) Completion of midterm exams (a compulsory activity accounting for 35% of the final grade, CB1, CB2, CG01, CG02, CT03, CE01).

For the second examination session, students will take a final exam that will count for 70% of the final grade. A minimum score of 4 out of 10 on this exam is required in order to average the grade. The mark obtained during the teaching period for component B1 will make up the remaining 30%. In order to pass the course, a final grade of at least 5 out of 10 is required.

In any case, the evaluation system will be regulated by that stated in the Evaluation and Qualification Regulations of the University of Valencia for Degrees and Masters

https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

REFERENCES

- Larson, R.; Hostetler, R. P. y Edwards, B. H., Cálculo I, McGraw-Hill (2006) ISBN: 9789701057100
- Neuhauser, C., Matemáticas para Ciencias, Pearson (2004) ISBN: 9788420542539
- James, G., Matemáticas avanzadas para la ingeniería. Segunda Edición, Pearson Education (2002) ISBN: 970-26-0209-2
- Apostol, T. M., Calculus, Ed. Reverté (1985) ISBN 997151396
- Stewart, J., Cálculo multivariable, Ed. Thomson Learning (2003) ISBN 9706861238