

**COURSE DATA****DATA SUBJECT****Code:** 34156**Name:** Mathematical analysis II**Cycle:** Undergraduate Studies**ECTS Credits:** 12**Academic year:** 2026-27**STUDY (S)**

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Facultat de Ciències Matemàtiques	2	Annual
1935 - Double Degree Program in Mathematics- Telematics Engineering	Facultat de Ciències Matemàtiques	2	Annual
1936 - Double Degree Program in Mathematics- Telematics Engineering	Facultat de Ciències Matemàtiques	2	Annual

SUBJECT-MATTER

Degree	Subject-matter	Character
1107 - Degree in Mathematics	Mathematical analysis	COMPULSORY
1935 - Double Degree Program in Mathematics- Telematics Engineering	Segundo curso	COMPULSORY
1936 - Double Degree Program in Mathematics- Telematics Engineering	Segundo curso	COMPULSORY

COORDINATION

MAZON RUIZ JOSE M

MARTINEZ CENTELLES JOSEP

SUMMARY

The domain of the differential and integral calculus of functions of several real variables is one of the foundations of mathematics training. One of the objectives of the second degree course must be the conceptual understanding and fluency in the use of basic techniques of this matter.

The course is divided into two parts, each one is studied in a semester. In the first part we study Differential Calculus, which is developed for functions defined in finite dimensional Euclidean spaces. The second part of the course is devoted to the study of the Lebesgue integral.



PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

Linear Algebra and Geometry I, Mathematical Analysis I

COMPETENCES / LEARNING OUTCOMES

1107 - Degree in Mathematics

Ability to work in teams.

Capacity for analysis and synthesis.

Capacity of abstraction and modeling.

Expressing mathematically in a rigorous and clear manner.

Knowing the time and the historical context in which occurred the great contributions of women and men in the development of mathematics.

Learn autonomously.

Possess and understand the mathematical knowledge.

Reason logically and identify errors in the procedures.

Solve problems that require the use of mathematical tools.

Visualize and interpret the solutions obtained.

DESCRIPTION OF CONTENTS

1. Limits, continuity and differentiability of functions of several variables.

2. Derivatives of higher order. Taylor's formula and local extrem of functions of several variables.



3. The inverse function theorem and implicit function theorem.

4. Extrema with constraints and Lagrange multipliers.

5. Lebesgue integrable functions.

6. Convergence theorems.

7. Fubini's Theorem.

8. Measurable functions and Lebesgue measure.

9. Criterion of integrability of Tonelli.

10. The change of variable formula.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	60,00
Other activities	15,00
Classroom practices	45,00
Total hours	120,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
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Attendance at other activities	15,00
Individual or group project	30,00
Independent study and work	55,00
Preparation of lessons	12,50
Preparation for assessment activities	42,50
Resolution of case studies	25,00
Total hours	180,00

TEACHING METHODOLOGY

- The aim is to gradually introduce and develop the theoretical and practical content of each topic and the right tools to solve problems.
- In the practical sessions we will apply the concepts presented in lectures to solve problems.
- Propose questions and problems for study. This study will be supervised and evaluated. In the practical sessions we will solve and correct exercises.
- Use a symbolic computation software package that helps in the conceptual understanding and visualization. It will also serve as a testing method to provide intuitive knowledge.

EVALUATION

Each student will demonstrate knowledge of basic concepts, skills and competences of the subject by means of theoretical and practical examinations. Also be assessed its capacity to address issues or resolve the problems posed by the teacher.

Evaluation will be conducted by:

- Written theory exams that will measure both the acquisition of knowledge and writing ability and rigor in proofs. Written practice exams will evaluate the ability to solve problems and exercises. There will be two exams throughout the course (middle and end of course). In each exam there will be a theoretical and a practical part which will contribute each fifty percent of the note provided that each note is greater than or equal to three out of ten. The note of each of the partial exams must be greater or equal to four out of ten. Students who take the final exam of the entire subject, to pass this Block, in addition to obtaining a minimum of 3 out of 10 in each of the theory and practice parts, must obtain a minimum grade of 4 out of 10 in the arithmetic average of theory and practice of each semester. Otherwise, the exam grade will be the minimum between the student's grade and 3.9.
- Participation on the tasks or controls proposed by the teacher will be evaluated (10%), provided that the obtained mark is above a minimum of four points.
- Participation in the seminars will be evaluated (10%), provided that the obtained mark is above a minimum of four points.

REFERENCES



- Apostol, T.M., Análisis Matemático, Editorial Reverté, 1977
- Mazón, J. M, Cálculo diferencial: Teoría y problemas., PUV Laboratori de Materials, 17. 2008
- Mazón, J.M. La Integral de Lebesgue en \mathbb{R}^n . Teoría y Problemas . PUV Laboratori de materials 71. 2016
- Stromberg, K. An introduction to Classical Real Analysis, Wordswoth Int. Math. Series, 1981.
- Bressoud, David, Second Year of Calculus, Ed. Springer-Verlag, 1991.
- Weir, A.J. Lebesgue Integration and Measure, Cambridge University Press, 1973.
- Ortega, J.M. Introducció a l'Anàlisi Matemàtica. Manuals de la Universitat Autònoma de Barcelona , 1993