

**COURSE DATA****DATA SUBJECT****Code:** 34173**Name:** Functional analysis**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2025-26**STUDY (S)**

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Facultat de Ciències Matemàtiques	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1107 - Degree in Mathematics	Seminar on Mathematical analysis	ELECTIVES

COORDINATION

BLASCO DE LA CRUZ OSCAR FCO

SUMMARY

In this subject we shall deal with some mathematical structures which allow to analyze properties of linear and continuous mappings between normed vector spaces of dimension, not necessarily finite, whose elements are mostly functions.

We shall concentrate in integral equations and compact operators.

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, Geometry I, Mathematical Analysis I, II and III.



COMPETENCES / LEARNING OUTCOMES

1107 - Degree in Mathematics

- Ability to work in teams.
- Capacity for analysis and synthesis.
- Capacity for criticism.
- 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.
- Solve problems that require the use of mathematical tools.
- Visualize and interpret the solutions obtained.

DESCRIPTION OF CONTENTS

- Chapter 1. Linear normed spaces.
- Chapter 2. Spaces of continuous and integrable functions.
- Chapter 3. Bounded and compact linear operators.
- Chapter 4. Duality.
- Chapter 5. Spectral Theory.
- Chapter 6. The fundamental Theorems.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
----------	-------



Theory	37,50
Other activities	7,50
Classroom practices	15,00
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	30,00
Preparation of lessons	5,00
Preparation for assessment activities	20,00
Resolution of case studies	15,00
Total hours	90,00

TEACHING METHODOLOGY

The basic concepts will be explained on the blackboard, allowing the student to present some of the previously assigned theorems.

The results demonstrated in class will be applied in practical classes, and both the teacher and the students will solve a set of problems adapted to the subject matter.

EVALUATION

The student will have to demonstrate the knowledge of the basic concepts and the acquisition of the competences of the subject mitjançant the realization of theoretical-practical exams. It is also worth valuing the name capacity to address the questions or solve the problems proposed by the professor.

The final mark will be achieved by the formula:

$$(8(\text{Pr}+\text{FE})+\text{C}+\text{E})/10$$

where:

Pr= Presentation (up to 3)

Q=Questions (up to 2)

P= Problems (up to 5)

FE= Final Exam = Q+P

C= Intermediate controls (up to 10).

E= Exercises solved in class (up to 10).

REFERENCES

- J.C. Robinson, An introduction to Functional Analysis. Cambridge Univ. Press, 2020.
- Y. Eidelman, V. Milman, A. Tsolomitis Analysis Funcional. An Introduction} Graduate Studies in



Mathematics, Vol 66, Amer. Math. Soc. Providence, R.I., 2004.

- A.E. Taylor & D. C. Lay, Introduction to Functional Analysis. Ed. Wiley and Sons, 1980.
- J. B. Conway, A Course of Functional Analysis. Second Edition. Ed. Springer, 1990.
- G.J.O. Jameson, Topology and Normed Spaces. Ed. Chapman and Hall, 1982.

Complementary references: