COURSE DATA

DATA SUBJECT

Code: 34151
Name: Mathematical analysis I
Cycle: Undergraduate Studies
ECTS Credits: 12
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Facultat de Ciències Matemàtiques	1	Annual
1935 - Double Degree Program in Mathematics-Telematics Engineering	Facultat de Ciències Matemàtiques	1	Annual
1936 - Double Degree Program in Mathematics-Telematics Engineering	Facultat de Ciències Matemàtiques	1	Annual

SUBJECT-MATTER

Degree	Subject-matter	Character
1107 - Degree in Mathematics	Mathematics	BASIC
1935 - Double Degree Program in Mathematics-Telematics Engineering	Primer curso	COMPULSORY
1936 - Double Degree Program in Mathematics-Telematics Engineering	Primer curso	COMPULSORY

COORDINATION

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SUMMARY

The first course in mathematical analysis aims to study the real functions of one real variable, and as need first knowledge of the real numbers.

Its essential core is the differential and integral calculus, and around this core are configured other elements that give consistency and foundation or which serve to illustrate the great utility for a variety of issues, concepts and techniques developed in the subject.

The course deepens, bases and complete knowledge that students have on this subject and provides the basis and tool for the study of other more advanced topics such as the Geometry, Applied Mathematics and Statistics, to be addressed in subsequent courses.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

As requirements for studying this subject, it is assumed that the student knows the contents of HIGH SCHOOL MATHEMATICS I AND II.

COMPETENCES / LEARNING OUTCOMES

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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.

DESCRIPTION OF CONTENTS

1. Axiomatic introduction of the real numbers and their graphical representation. Principle of mathematical induction. Inequalities and absolute value. Rational and irrational numbers.

2. Introduction to real functions: graphical representation and elementary functions.

3. Numerical sequences and their limits.

4. The limit functional: continuity of functions of one variable real.

5. Differentiation of functions of one real variable.

6. The mean value theorem and Taylor's formula. Extreme values.

7. Calculation of primitives.

8. Riemann integral of functions of one real variable. Geometric interpretation. The Fundamental Theorem of Calculus.

9. Numerical series: convergence criteria and the sum of some of them.

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
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

1. To be gradually introduced and develop the theoretical and practical contents of each topic and the right tools to solve problems.

2. In the practical sessions we will apply the concepts presented in lectures to solve problems.

3. Questions and problems will be proposed. This study will be supervised and evaluated. In the practical sessions we shall solve and correct exercises.

4. It will use a symbolic computation software package that helps both conceptual understanding and visualization. It will also serve as a testing method to provide intuitive knowledge.

EVALUATION

Evaluation will consists of the following three ítems:

Item 1: Written exams will be measured both the acquisition of Knowledge, writing ability and rigor in proofs at the theoretical part as well as the ability to solve problems and exercises at the practical part.

Theoretical and practical part will provide each fifty percent of the note provided that each note becomes equal or greater than three out of ten. Otherwise, the note of the exam will be the minumum between the average and 3,9.

There will be two exams throughout the course, at the end of each semester. The note of each of the partial exams must be greater or equal to four out of ten.

To pass one must obtain a minimum grade of 4 out of 10 on this item. Thiis item counts 80% oof the final grade.

Item 2: Participation in the taskes proposed by the teacher and coontrols.

Item 3: Participation in the seminars.

Marks corresponding to ítems 2 and 3 count each one 10% of the final grade and are considered not-recoverable, that is, they cannot be evaluated by an exam. The marks will be kept for the whole academic year.

REFERENCES

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- S. Abbott; Understanding analysis, Undergraduate Texts in Mathematics, Springer, New York, 2015
- T. Tao, Analysis I, Texts and Readings in Mathematics, {\bf 37}, Hindustan Book Agency, New Delhi, 2009.
- Kitchen, J.W.: Cálculo, Mc. Graw Hill, 1986

- Spivak, M.: Cálculo infinitesimal, Editorial Reverté, 1980
- Stromberg, K.: Introduction to classical real analysis. Wodsworth International Mathematics Series, Belmont, Calif., 1981.

Complementary references:

- Bresoud, D.: A radical approach to Real Analysis, The Mathematical Asociation of America, 1993.
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- Hairer. E.; Wanner, G.: Analysis by its history, Springer, 1995.
- Marsden, J.; Weinstein, A.: Calculus, Springer Verlag, 1985.
- Ortega, J.M.: Introducció a l'Anàlisi Matemàtica, 2ª Ed. U.A.B., 2002.
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