VNIVERSITAT DE VALÈNCIA

Course Guide
34151 Mathematical analysis I

COURSE DATA

Data Subject	
Code	34151
Name	Mathematical analysis I
Cycle	Grade
ECTS Credits	12.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Faculty of Mathematics	1	Annual
1935 - PDG Matemàtiques-Telemàtica	Faculty of Mathematics	1	Annual
1936 - PDG Matemàtiques-Informàtica	Faculty of Mathematics	1	Annual

Subject-matter

Degree	Subject-matter	Character
1107 - Degree in Mathematics	1 - Mathematics	Basic Training
1935 - PDG Matemàtiques-Telemàtica	1 - Primer curso	Basic Training
1936 - PDG Matemàtiques-Informàtica	1 - Primer curso	Basic Training

Coordination

Name	Department
CRESPO GARCIA, RAFAEL	15 - Mathematical Analysis
MOLTO MARTINEZ, ANIBAL FCO JAVIER	15 - Mathematical Analysis
RUEDA SEGADO, MARIA PILAR	15 - Mathematical Analysis

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.

OUTCOMES

1107 - Degree in Mathematics

- Capacity for analysis and synthesis.
- Ability to work in teams.
- Learn autonomously.
- Possess and understand the mathematical knowledge.
- Expressing mathematically in a rigorous and clear manner.
- Reason logically and identify errors in the procedures.
- Capacity of abstraction and modeling.
- Knowing the time and the historical context in which occurred the great contributions of women and men in the development of mathematics.

LEARNING OUTCOMES

According to the Plan document of the studies defined the Degree in Mathematics, Calculus I Course is to enable the acquisition of the following competencies:

SPECIFIC (numbering is maintained from the original document).

Specific competence 1: Manipulating inequalities, analyze functions, relate the properties of a function

and its graph.

Specific competence 2: To work intuitively with geometric and formal notions of limit, derivative and integral.

Specific Competence 3: To know the basic techniques for calculating primitives(change of variable, integration by parts, integration of rational functions), and its application to the calculation of definite integrals.

Specific competence 4: To use the concepts of derivate and integral in specific applications to other fields of knowledge.

Specific competence 5: To solve practical problems that involve calculating integrals and optimizing functions.

Specific competence 6: To know formally correct definition of the most relevant concepts (convergence, limit, continuity, differentiability, integrability).

Specific competence 7: To know and to show proofs, formally correct, on the most relevant results.

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

ACTIVITY	Hours	% To be attended
Theory classes	60,00	100
Classroom practices	45,00	100
Other activities	15,00	100
Attendance at events and external activities	15,00	0
Development of group work	15,00	0
Development of individual work	15,00	0
Study and independent work	35,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	37,50	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	2,50	0
Resolution of case studies	25,00	0
Resolution of online questionnaires	5,00	0
TOTAL	**285,00**	

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:

1) 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.

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

3) 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

Basic

- Referencia b1: Bartle, R.; Sherbert, D.R.: Introducción al Análisis Matemático de una variable, Ed. Limusa, 1996.

Referencia b2: S. Abbott; Understanding analysis, Undergraduate Texts in Mathematics, Springer, New York, 2015.

Referencia b3: T. Tao, Analysis I, Texts and Readings in Mathematics, {\bf 37}, Hindustan Book Agency, New Delhi, 2009.

Referencia b4: Kitchen, J.W.: Cálculo, Mc. Graw Hill, 1986.

Referencia b5: Spivak, M.: Cálculo infinitesimal, Editorial Reverté, 1980.

Referencia b6: Stromberg, K.: Introduction to classical real analysis. Wodsworth International Mathematics Series, Belmont, Calif., 1981.

Additional

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Referencia c1: Beals, R.: Analysis, An Introduction. Cambridge University Press, 2004.

Referencia c2: Bresoud, D.: A radical approach to Real Analysis, The Mathematical Asociation of America, 1993.

Referencia c3: de Burgos Román, J.: Análisis Matemático: Problemas útiles. Ed. García-Maroto, 2007.

Referencia c4: Durán, A.: Historia, con personajes de los conceptos del cálculo, Alianza Universidad, 1996.

Referencia c5: Hairer. E.; Wanner, G.: Analysis by its history, Springer, 1995.

Referencia c6: Marsden, J.; Weinstein, A.: Calculus, Springer Verlag, 1985.

Referencia c7: Ortega, J.M.: Introducció a lAnàlisi Matemàtica, 2ª Ed. U.A.B., 2002.

Referencia c8: Rudin, W. Principios de análisis matemático, 3a ed. McGraw-Hill, 1990.