COURSE DATA

DATA SUBJECT

Code: 34158
Name: Mathematical analysis IV
Cycle: Undergraduate Studies
ECTS Credits: 9
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	Mathematical analysis	COMPULSORY

COORDINATION

BLASCO DE LA CRUZ OSCAR FCO

GALINDO PASTOR PABLO

SUMMARY

The aim of this course is to introduce students to the theory of differentiable functions of complex variable, showing its main properties and applications: Cauchy's theorem and the residue theorem and its application to the calculation of real integrals and the sum of series.

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 and Mathematical Analysis I, II, III.

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.

Solve problems that require the use of mathematical tools.

Visualize and interpret the solutions obtained.

DESCRIPTION OF CONTENTS

1. The fiel of complex numbers.

2. Derivation of complex functions. Cauchy-Riemann equations.

3. Real and complex powers series Pointwise and uniform convergence.

4. Complex integration. Cauchy's integral theorem. Taylor series.

5. Singularities. Residue theorem.

6. Applications.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	45,00
Other activities	11,00
Classroom practices	34,00
Total hours	**90,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	22,00
Independent study and work	43,00
Preparation of lessons	24,50
Preparation for assessment activities	35,50
Resolution of case studies	10,00
Total hours	**135,00**

TEACHING METHODOLOGY

a. The aim is to gradually introduce and develop the theoretical and practical content of each topic and the right tools to solve problems.

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

c. Proposed questions and problems for study. This study will be supervised and evaluated. In the practical sessions we will solve and correct exercises.

EVALUATION

Each student must show 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 ruled by the following criteria:

1) 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. Along the course there will be a control and a final examination. Either in the control and in the examination there will be a theoretical and a practical part which will contribute each fifty percent of the grade, provided that each grade is greater than or equal to three out of ten. In the case that any of the grades does not reach more than three points, the grade of the examination/control will be the minimum of the grade average and four. The final grade will be the average of the grade of both parts.

2) The control means 10% of the final grade.

3) Participation in the seminars and in the tasks proposed by the teacher will be another 10% of the final grade.

4) The grades corresponding to the continuous evaluation will be kept in the two calls for the academic year in which they have been made, since their evaluation is only possible throughout the semester and not in the extraordinary session.

REFERENCES

- ASH, R.B. "Complex Variables". Academic Press 1971
- JAMESON, D.J.O. "A First Course on Complex Analysis". Chapman and Hall Mathematics Series. Springer-Verlag, 1970
- MARSDEN, J.E., HOFMAN, J.J. "Basic Complex Analysis" W.H.Freeman and Co. 1970
- MAZON J.M., Funciones de Variable Compleja. Teoría y Problemas. Amazon, 20211. xviii+411 pp. ISBN: 9798506409052
- PALKA, R.P. "Introduction to Complex Function Theory" Springer. 1991
- KRZYZ, J.G. "Problems in Complex Variable Theory". American Elsevier Pub. Co., 1971

Complementary references

- BURCKEL, R.B. "An introduction to Classical Complex Analysis). Academic Press. 1979.
- CONWAY, J.B. "Functions of One Complex Variable".Springer. 1978
- RAO, M., STETKAER, H. ``Complex Analysis. An invitation". World Scientific, 1991.
- RUDIN, W. "Real and Complex Analysis" Mc Graw Hill 1977

• WUNSCH, A.D. Variable compleja con aplicaciones. Add. Wesley Iberoamericana. Segunda edición, 1997.