COURSE DATA

Data Subject	
Code	34158
Name	Mathematical analysis IV
Cycle	Grade
ECTS Credits	9.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Faculty of Mathematics	4	First term

Subject-matter

Degree	Subject-matter	Character
1107 - Degree in Mathematics	6 - Mathematical analysis	Obligatory

Coordination

Name	Department
FERNANDEZ ROSELL, MARIA CARMEN	15 - Mathematical Analysis
MAZON RUIZ, JOSE M	15 - Mathematical Analysis

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.

OUTCOMES

1107 - Degree in Mathematics

- Capacity for analysis and synthesis.
- Solve problems that require the use of mathematical tools.
- 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.
- Visualize and interpret the solutions obtained.

LEARNING OUTCOMES

The student will understand the concepts of pointwise convergence and uniform convergence and identify uniform convergence of series using the criterion M-Weierstrass.

He/She should become familiar with the basics of the complex variable.

He/She must know how to use the relationship between holomorphic and analytic functions.

He/She should know how to calculate residues and use them for evaluating real integrals.

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

ACTIVITY	Hours	% To be attended
Theory classes	56,00	100
Classroom practices	34,00	100
Other activities	11,00	100
Development of group work	7,00	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	35,50	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	14,50	0
Resolution of case studies	10,00	0
TOTAL	**233,00**	

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

Basic

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Referència b1: ASH, R.B. "Complex Variables". Academic Press 1971

Referència b2: JAMESON, D.J.O. "A First Course on Complex Analysis". Chapman and Hall Mathematics Series. Springer-Verlag, 1970

Referència b3: MARSDEN, J.E., HOFMAN, J.J. "Basic Complex Analysis" W.H.Freeman and Co. 1970

Referència b4: GAMELIN, T., Complex analysis. UTM. Springer-Verlag, New York, 2001. xviii+478 pp. ISBN: 0-387-95093-1; 0-387-95069-9

Referència b5: PALKA, R.P. "Introduction to Complex Function Theory" Springer. 1991

Referència b6: KRZYZ, J.G. "Problems in Complex Variable Theory". American Elsevier Pub. Co., 1971

Additional

- Referencia c1: BURCKEL, R.B. "An introduction to Classical Complex Analysis). Academic Press. 1979.

Referencia c2: CONWAY, J.B. "Functions of One Complex Variable".Springer. 1978

Referencia c3: RAO, M., STETKAER, H. ``Complex Analysis. An invitation". World Scientific, 1991.

Referencia c4: RUDIN, W. "Real and Complex Analysis" Mc Graw Hill 1977

Referencia c5: WUNSCH, A.D. Variable compleja con aplicaciones. Add. Wesley Iberoamericana. Segunda edición, 1997.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available