COURSE DATA

DATA SUBJECT

Code: 44994
Name: Estrategias analíticas para la resolución de problemas socio-económicos
Cycle: Master's Degree
ECTS Credits: 5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
2249 - Master's Degree in Chemistry	Facultat de Química	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2249 - Master's Degree in Chemistry	Aplicaciones de la Química Analítica	COMPULSORY

COORDINATION

RUIZ ANGEL MARIA JOSE

SUMMARY

"Analytical Strategies for solving socio-economic problems" is part of the Applied Chemistry module and is intended to expand and complement the knowledge of Analytical Chemistry acquired in the Degree. Specifically, this course deepens student's knowledge of quality assurance of the analytical process; chemometric treatment of data as a tool for obtaining quality information, both qualitative (exploratory analysis) and quantitative; stages of preparation and treatment of samples introducing assisted systems and microextraction techniques and study of advanced instrumental analysis techniques including the sustainability of procedures, the use of automated systems, direct measurements and portable instrumentation. Data treatment will focus on exploratory analysis through principal component analysis and classification problems applying discriminant analysis, ending with the use of multivariate regression through partial least squares. Advanced instrumental techniques such as the application of automation and sensors for the control of products and processes will be studied.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

Previous knowledge of chemistry and mathematics that is taught in the degrees indicated in the recommended entry profile for the Master student is required.

COMPETENCES / LEARNING OUTCOMES

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Apply the advanced theoretical and practical knowledge gained in the different specialties of chemistry to R&D and innovation.

Be able to conduct any type of research in the field of chemistry and/or the chemical industry, as a specialist.

Be able to defend positions in debates and colloquia in a rigorous and reasoned manner.

Be able to design, conduct, analyse and interpret complex experiments and data, as a specialist.

Be able to present and defend publicly the results obtained in scientific research or as a result of work in a chemical industry.

Be able to solve complex chemistry problems, whether in the academic, research or industrial application areas at a specialization or masters-level.

Fomentar, en contextos académicos y profesionales del ámbito de la política económica,
el avance tecnológico, social o cultural dentro de una sociedad basada en el conocimiento y en el respeto a: a) los derechos fundamentales y de igualdad de oportunidades entre hombres y mujeres, b) los principios de igualdad de oportunidades y accesibilidad universal de las personas con discapacidad y c) los valores propios de una cultura de paz y valores democrático.

Gain experience in the use of information tools and in the management of the information obtained.

Gain skills and knowledge in advanced analytical techniques that can contribute to the economic and social development of the environment.

Have the ability to plan and to manage time and resources and gain experience in decision-making.

Possess the ability to plan and manage time and resources and gain experience in decision-making.

Possess the necessary skills to develop multidisciplinary activities within the field of chemistry at the master's level.

Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.

Students should communicate conclusions and underlying knowledge clearly and unambiguously to both

specialized and non-specialized audiences.

Students should demonstrate self-directed learning skills for continued academic growth.

Students should possess and understand foundational knowledge that enables original thinking and research in the field.

DESCRIPTION OF CONTENTS

1. Quality criteria for analytical methods

Validation of analysis methods. Study of applicable standards.

2. Application of multivariate analysis techniques to the study of analytical data

Exploratory data analysis. Classification techniques. Multivariate regression. Study of practical cases.

3. Advanced sample preparation and separation methods

Use of assisted systems for sample preparation. Microextraction techniques. New developments.

4. Analytical procedures for the control of chemical processes.

Advanced instrumental analysis techniques. Sustainability of analytical procedures. Automatic and continuous equipment for product and process analysis.

5. Study of methods of analysis of industrial interest

Analysis of basic chemical products: raw materials, solvents,... Analysis of formulations: active principles, additives, contaminants,...

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	10,00
Theory	40,00
Total hours	**50,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	75,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**75,00**

TEACHING METHODOLOGY

The course will be taught in asynchronous online mode. Among other training activities, applied practical problems will be solved in order to evaluate the student's understanding of the subject. In addition, use will be made of the Virtual Classroom platform, a virtual space where all the information considered appropriate for the development of teaching and control of student participation in the proposed activities is deposited.

EVALUATION

First call: The grade of the subject in the first call will be obtained from the marks obtained in the final exam and the continuous assessment activities, carried out throughout the course. Exam and continuous assessment activities will be averaged according to the following percentages:

(a) On-site final exam: 70%.

(b) Continuous assessment activities: 30% (Presentation of assignments 15%, other activities 15%).

The minimum grade in each of the parts must be equal to or higher than 4.5 to be able to do the average

. The minimum overall grade to pass the course will be 5.0.

Second call: The grade of the subject, in the second call, will be obtained by applying the same criteria as in the first call.

REFERENCES

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