

COURSE DESCRIPTION

COURSE DETAILS

Title (of the course): **SISTEMAS DE LA CALIDAD EN LOS LABORATORIOS ANALÍTICOS**

Code: 100478

Degree/Master: **GRADO DE QUÍMICA**

Year: 4

Name of the module to which it belongs: APLICADO

Field: QUÍMICA (OPTATIVA 3)

Character: OPTATIVA

Duration: SECOND TERM

ECTS Credits: 3.0

Classroom hours: 30

Face-to-face classroom percentage: 40.0%

Study hours: 45

Online platform: <http://moodle.uco.es/m2324>

LECTURER INFORMATION

Name: LÓPEZ LORENTE, ÁNGELA INMACULADA (Coordinator)

Department: QUÍMICA ANALÍTICA

Area: QUÍMICA ANALÍTICA

Office location: Edificio Marie Curie-Anexo C3 -2ª planta

E-Mail: q32loloa@uco.es

Phone: 957218562

URL web: <http://moodle.uco.es/moodlemap/>

PREREQUISITES AND RECOMMENDATIONS

Prerequisites established in the study plan

Students can matriculate in optative subjects once they have passed the 60 credits of basic formation and, at least, other 30 credits corresponding to obligatory subjects.

Recommendations

Students should certify at least B1 English level

INTENDED LEARNING OUTCOMES

- CB4 Knowledge of a foreign language.
- CB5 Capacity to manage data and generate information / knowledge.
- CB6 Resolution of problems.
- CB9 Critical thinking.
- CE18 Metrology of chemical processes including quality management.
- CE19 Capacity to organise, direct and execute chemical laboratory tasks and tasks related to the production of complex industrial facilities where chemical processes are developed. Moreover, to design the work method to be used.
- CE24 Capacity to recognise and exercise good practices in scientific work.
- CE26 Skilled in the handling and computer processing of data and chemical information.
- CU2 Knowledge and perfection of user level in the area of ICTs.

COURSE DESCRIPTION

OBJECTIVES

The main objectives of this module are:

- To introduce the students in all the aspects related with the Quality Systems in the analytical laboratories, thus showing them the key elements: regulations, documents, metrological tools and basic activities.
- To show the students the relevance of the correct application of the chemical metrology to ensure the quality of qualitative, quantitative and structural information generated in the analytical laboratories.
- To teach the students the statistical treatment of the data obtained by chemical measurements in order to assess metrological properties (traceability and uncertainty).
- To present the required activities for the validation of analytical processes and the control and evaluation of the quality in the analytical laboratories.

CONTENT

1. Theory contents

Theoretical contents are divided into 8 lessons:

- 1. Introduction to Quality Systems.** Normative references of Quality Systems. National Standard Developing Organizations (SDOs). Certification and Accreditation. ISO 9000 series and the UNE-EN-ISO/IEC 17025. Good Laboratory Practices (GLPs).
- 2. Documentation of Quality Systems.** Types of documents. Quality Handbook. Procedures and working instructions.
- 3. Metrological properties in the analytical laboratory.** Chemical metrology. Metrological properties: traceability and uncertainty.
- 4. Statistical tools for the analytical quality.** Confidence limits. Demonstration of traceability. Parameters to express uncertainty. Calculations of uncertainty. Expression of analytical results.
- 5. Analytical tools.** Quality of materials and methods. Metrological references: types. Certified Reference Materials (CRMs)/ Standard Reference Materials (SRMs).
- 6. Sample and equipment management.** Sampling planning and validation. Maintenance, calibration and verification of equipment. Documentation related to sample and equipment management.
- 7. Validation and Internal Quality Control.** The concept of validation. Internal and external validation. Control activities. Control charts.
- 8. Quality assessment.** Internal and external assessment of quality. Intercomparison exercise, collaborative and certification trials. Audits.

2. Practical contents

Practical contents are essentially divided into four blocks:

1. Statistical tests of significance to demonstrate the traceability of analytical results.
2. Uncertainty calculations of a single step of the analytical process or the complete analytical process using bottom-up and top-down procedures.
3. Use of statistical software for data analysis.
4. Other activities related to the theoretical topics included in the syllabus.

SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Good health and well-being
Quality education



COURSE DESCRIPTION

METHODOLOGY

Methodological adaptations for part-time students and students with disabilities and special educational needs

Teaching methodology will be adapted for part-time students according to the University of Córdoba regulations.

Teaching methodology will also be adapted for students with special educational needs according to the Faculty of Sciences regulations.

In both cases, individual situations will be considered.

Face-to-face activities

Activity	Large group	Medium group	Total
Assessment activities	-	3	3
Group presentation	-	5	5
Lectures	17	-	17
Seminar	-	5	5
Total hours:	17	13	30

Off-site activities

Activity	Total
Activities	10
Exercises	10
Self-study	25
Total hours	45

WORK MATERIALS FOR STUDENTS

Coursebook - <http://moodle.uco.es/moodlemap/>

Exercises and activities - <http://moodle.uco.es/moodlemap/>

Oral presentations - <http://moodle.uco.es/moodlemap/>

Clarifications

Material for practical activities and exercises will be provided to students at the beginning of each unit.

EVALUATION

COURSE DESCRIPTION

Intended learning	Exams	Oral Presentation	Problem solving
CB4		X	
CB5		X	X
CB6			X
CB9	X	X	X
CE18	X	X	X
CE19			X
CE24	X		
CE26		X	X
CU2		X	
Total (100%)	35%	35%	30%
Minimum grade	5	5	5

(*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

Method of assessment of attendance:

Attendance to a minimum of 70% of the independent activities will increase a 25% the final grade.

General clarifications on instruments for evaluation:

For full-time students, the evaluation system will be as follows:

The final mark of the subject will be the sum of the marks obtained in an exam (35%), which will consist of questions related to theoretical contents of the module (being able to have all the class material available) that will be carried out in a medium group (GM) session, as well as an oral presentation in class (GM) about a piece of work, with a weight of 35% in the final mark, and continuous problem-solving assessment exercises (30%) carried out in the seminars (GM). The bibliographic search for the oral presentation will be positively recognized. It will be necessary to obtain a minimum score of 5 points in each evaluation tool so that they can contribute to the final mark. In any case, the final mark to pass the subject must be equal to or greater than 5. Those students who do not pass the exam in the corresponding session will have the option of recovery in the ordinary and/or extraordinary official calls for course exams.

Clarifications on the methodology for part-time students and students with disabilities and special educational needs:

Evaluation will be adapted for part-time students according to the University of Córdoba regulations and will be individually considered.

Evaluation will be adapted for students with special educational needs according to the University of Córdoba regulations and will be individually considered.

COURSE DESCRIPTION

Clarifications on the evaluation of the extraordinary call and extra-ordinary call for completion studies:

The same criteria specified for ordinary evaluation calls will be followed.

Qualifying criteria for obtaining honors:

Based on the article 80.3 of the Academic Regulations of the University of Cordoba.

BIBLIOGRAPHY

1. Basic Bibliography

- ISO 9001:2015. Quality management systems – Requirements, ISO. Geneva. Switzerland.
- ISO 9000:2015: Quality management systems -- Fundamentals and vocabulary ISO. Geneva. Switzerland.
- ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. ISO. Geneva. Switzerland.
- The Quality Toolbox, Second Edition, Nancy R. Tague, 2013.

2. Further reading

- La calidad en los laboratorios analíticos. Valcárcel M, Ríos A. Reverté, 1992.
- Quality in the Analytical Chemistry Laboratory. Prichard E. John Wiley & Sons, 2007.
- Analytical Measurement Terminology: Handbook of Terms used in Quality Assurance of Analytical Measurement (Valid Analytical Measurement) 1st Edition, Prichard E, Benson E, RSC Books, 2001.
- Quality Assurance in Analytical Chemistry. Funk W, Dammann V, Donnevert G, VCH, 1995.
- Quality Control in Analytical Chemistry. Kateman G, Piskers F W, Wiley, 1994.
- Handbook of Quality Assurance for the Analytical Laboratory. Dux JP, VanNostrand R, Reinhold, 1990.
- Quality Assurance Principles for Analytical Laboratories. Garfield FM, AOAC, 1991.
- Quality Assurance of Chemical Measurements. Taylor JK, Lewis Pub., 1987.
- Quality Management Handbook. Walsh L, Wurster R, Kimber RJ, Marcel Dekker, 1986

COORDINATION CRITERIA

Common evaluation criteria

Tasks performance

SCHEDULE

Period	Assessment activities	Group presentation	Lectures	Seminar
1# Week	0,0	0,0	2,0	0,0
2# Week	0,0	0,0	2,0	0,0
3# Week	0,0	0,0	2,0	0,0
4# Week	0,0	0,0	2,0	2,0
5# Week	0,0	0,0	2,0	2,0

COURSE DESCRIPTION

Period	Assessment activities	Group presentation	Lectures	Seminar
6# Week	0,0	1,0	2,0	1,0
7# Week	0,0	2,0	2,0	0,0
8# Week	0,0	2,0	2,0	0,0
9# Week	3,0	0,0	1,0	0,0
Total hours:	3,0	5,0	17,0	5,0

The methodological strategies and the evaluation system contemplated in this Course Description will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.